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## PROJECT REPORT

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Project Title: Fostering Teacher-Teacher Communication: A Principals' Strategy for Improving Student Outcomes

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## ABSTRACT

**For large-scale projects, please provide in the space below an abstract of not more than 300 words, single-spaced, written in a language that may be understood by the informed layperson. For small-scale projects, an abstract per se may not be appropriate, and the report itself may be started below.**

A considerable body of research has developed which makes the case for school administrators to take on a role as curriculum leader. Efforts to foster necessary leadership skills in principals have met with only moderate success primarily because of our limited knowledge of influences on principals' behaviors and actions and about variables that mediate principals effects on classroom practices and student outcomes. One such mediating variable is teacher-teacher interaction: much recent research suggests that "collaborative cultures" can have significant effects on what teachers do and ultimately on what students learn. The present study sought to further our understanding of patterns of interrelationship among these concepts. A conceptual framework was developed and data were collected pertaining to components in the framework to test it. The study was conducted in the context of an ongoing large scale in-service project with a goal of improving junior division childrens' thinking skills. As a substudy, a group of principals participated in a project designed to help them foster collaboration among staff in their schools regarding teaching thinking skills.

Data were collected in 40 schools from 40 principals, 33 teacher librarians, 88 grade 5 teachers and 1,990 grade 5 students. Data varied from student achievement tests, activity records, questionnaires and interviews. The conceptual framework was tested using path analysis. The hypothesized model was not supported to the extent that teacher-teacher interaction was found to relate negatively (albeit weakly) with their activity implementing thinking skills in their classrooms and with student achievement. Principals efforts to promote collaboration were moderately successful at best. As predicted, influences on principals and teacher collaboration were found to depend on the culture of the school. Results were discussed in terms of methodological considerations, principals' motives, and concepts associated with the culture of the school. Implications for theory and practice were listed.

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# FOSTERING TEACHER-TEACHER INTERACTION: PRINCIPALS' EFFORTS TO IMPROVE STUDENT OUTCOMES

## 1. PROJECT OBJECTIVES

This project focused on the principal's role as instructional leader in the school. The central objective of the study was to examine whether, and the extent to which, principals influence positive student learning outcomes through their efforts to foster collaboration in the schools. Specific questions guiding the research were:

- to what extent do principals foster teacher-teacher interaction within their schools regarding specific curriculum innovations?
- do principals' efforts to stimulate teacher-teacher interaction affect teachers' actions in the classroom and ultimately, student outcomes?
- to what extent does innovation specific teacher-teacher interaction depend on the culture of the school?

As a sub-problem for the study, a strategy for strengthening principals' effectiveness in promoting innovation specific, teacher-teacher interaction was developed, implemented and evaluated.

## 2. REVIEW OF LITERATURE

### 2.1 BACKGROUND

Researchers and practitioners agree that the principal plays a key role, for better or worse, in the curriculum decisions made in the school and, ultimately, in influencing student outcomes (Andrews, Soder & Jacoby, 1986; Fullan, 1981; 1987; Hall, 1987a; Leithwood & Montgomery, 1982; 1986; Rosenholtz, 1985; Wellisch, MacQueen, Carriere & Duck, 1978). The evidence, although not entirely uniform (see, for example, Zirkel & Greenwood, 1987), is sufficient to warrant moving beyond investigations of whether principals are having an impact in schools to "addressing the areas and degrees of influence and the consequences of principals' actions, and non-actions" (Hall, 1987a, p. 1).

Initiatives have been launched to improve the impact on classroom practice and student outcomes attributable to the principal. Many of these, however, have been relatively unsuccessful. Zirkel & Greenwood (1987), for example, cite several studies where the impact of the principal has been severely limited.

Past efforts to improve principal performance have been limited in at least three ways. First, the range of target student learning objectives addressed in previous efforts has been restricted. The aspirations of change agents have tended to focus on changes within the "transmission" curriculum (consisting of basic skills and verbatim recall objectives). In contrast, the goals of education in Ontario, and in many other jurisdictions, give much greater attention to the "transactional" curriculum; for example, higher order skills and complex conceptual understandings that contribute to the development of the "self-directed problem solver" (Miller & Seller, 1985; Miller, 1988). This type of change is much more difficult to achieve, as indicated by the persistence of the transmission orientation curriculum (Hoetker & Ahlbrand, 1969; Sirotnik, 1983)

A second way in which efforts to improve principals' practices have been limited concerns our lack of research-based knowledge about influences (external and internal) on such practices. In a comprehensive review of recent empirical research on the principalship, Leithwood, Begley & Cousins (in press) concluded that "the body of research evidence currently available which explores relationships among external influences, internal [mental] states and principals' practices is extremely limited in quantity" (p. 24). They also expressed concern about the "uneven" conceptual and methodological quality of research on this aspect of the principalship. The use of a coherent theory to guide research concerning influences on principals' practices of internal mental processes is unusual. From the methodological standpoint, very little research of a "cause and effect" orientation has accrued with these variables as the foci.

A third limitation of previous efforts to improve principal performance concerns our lack of knowledge about mediating effects. The Leithwood et al. (in press) review identifies four dimensions of principal practice derived from a developmental conception of the principalship (Leithwood & Montgomery, 1986). These dimensions are (1) the nature, source and use of goals principals attempt to accomplish in their schools, (2) the classroom and school-wide factors principals believe they must influence in order to attain their goals, (3) the strategies used by principals to influence these factors, and (4) the nature of decision-making processes. Leithwood et al. (in press) show that research linking principal actions (or strategies) to classroom and school factors has generally taken the form of descriptions of either typical or effective practice. Although evidence is available about principals' influences on variables such as classroom curriculum, instructional practices of teachers, availability of material resources for instruction, and climate and culture in the school, little is known about how these variables act to mediate principal influences on student outcomes.

## 2.2 THEORETICAL FRAMEWORK

This study addresses these deficiencies of past principal improvement efforts in the context of a three year dissemination project designed to upgrade the problem solving skills of Junior Division pupils. The framework used to guide this development and implementation project appears in Figure 1. The case supporting the inclusion of elements in this framework and the relations among them is described below.

**Teachers' Influence on Students:** Investigations conducted by one of the present investigators provides evidence that student mastery of problem-solving objectives identified in Ministry guidelines can be improved substantially if the instructional strategies of teachers are modified. For example, a recent meta-analysis of students' ability to control variables when designing an experiment found that effect sizes were higher when teachers made the mental operations underlying the performance explicit to students by demonstrating the requisite operations when introducing new learning and by focusing on these operations during practice and feedback phases (Ross, 1988a). A series of instructional principles based on this theme, described in Robinson, Ross and White (1985), had been used to generate a series of instructional improvement strategies which have had a consistently positive impact on student outcomes (Maynes & Ross, 1984; Ross, 1981; 1986; Ross & Maynes, 1983a; 1983b; Ross & Robinson, 1987).

In the specific context of this study, the link between student outcomes (Component 5) and teacher actions (Component 4) is based upon the findings from a previously funded Transfer Grant project (Ross, 1988b) which produced a set of instructional materials designed to improve children's problem-solving skills in Junior Division social & environmental studies topics. When field tested in two sites over two and three month periods, the average student in the treatment group outperformed 98 percent of the students in the control group. Similar results were obtained in a subsequent follow-up investigation involving larger samples (Ross, in press).

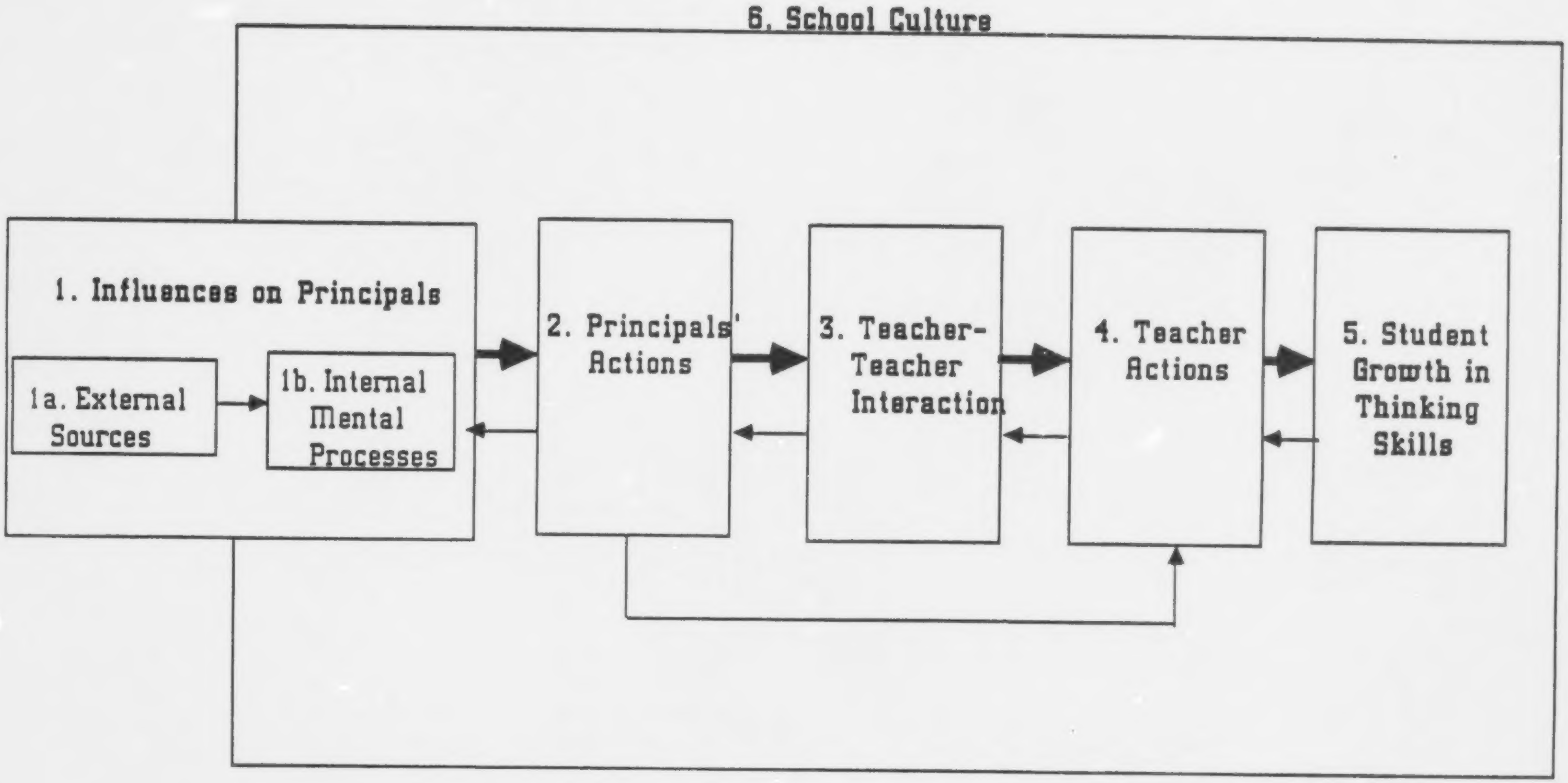
6. School Culture
1. Influences on Principals
1a. External Sources
1b. Internal Mental Processes
2. Principals' Actions
3. Teacher-Teacher Interaction
4. Teacher Actions
5. Student Growth in Thinking Skills

Figure 1

Conceptual Framework: Principals' Role in Promoting Student Growth Through Fostering Collaboration

**Teacher-Teacher Interaction Influences on Teacher Actions:** There is considerable evidence that teacher actions (Component 4) can be influenced by teacher-teacher communication (Component 3) about curriculum planning and delivery. For example, Little (1982) identified several teacher behaviours that were found to have positive influences on instructional practices and student outcomes. These included: inviting other teachers to observe their classroom practices; observing other teachers' classroom practices; teaching others in formal in-service sessions; teaching others informally; talking "publicly" about what one is learning or wants to learn; and designing in-service.

These behaviours are linked to the concept of enhanced school-based collegiality involving specific support and discussion of classroom practice; mutual observation and critique; shared understanding regarding an innovation; and shared participation in implementing that innovation. In Little's account, "the utility of collegial work and the rigor of experimentation with teaching is a direct function of the correctness, precision, and coherence of shared language" (p. 331). Evidence in support of influences of "teacher-talk" on instructional practices has been mounting steadily. In reviews of empirical literature on knowledge utilization (Fullan, 1981) and in-service effectiveness (Bennett, 1987), authors have concluded that teachers learn more from other teachers than from any other agent in the school system. Bennett found that this was particularly the case when the transfer of skills to new contexts was the central focus. Rosenholtz (1985), in her synthesis of effective schools research, concluded that "collegial norms represent a form of group problem solving, social support and ongoing professional development" (p. 380). More recently, Louis and Dentler (1988) found, in their review of several school improvement projects, that teachers talking about an innovation played a key role in adoption and implementation decisions.

**Principals' Influence on Teacher-Teacher Interaction:** Principals act to influence various classroom and school-wide factors that have a direct bearing on valued student outcomes (Leithwood & Montgomery, 1986). Some principal actions or strategies have been shown to have favorable influence, relatively directly, on classroom factors such as program objectives and emphasis and other instructional behaviours of teachers. For example, explicit and salient support and commitment to an innovation by the principal (Fullan, 1981; Ingvarson & McKenzie, 1988; Little, 1982) and the provision of access to resources for staff (Ingvarson & McKenzie, 1988; Joyce & Showers, 1988) have been shown to influence teacher practices in the classroom.

Other data suggest that principals' influence on teacher practice may also be mediated by their influence on school-wide factors. In particular, setting priorities and promoting among staff shared aims and a common vision (Joyce & Showers, 1988; Little 1984, Leithwood & Cousins, 1988; Wellisch, et al., 1978), providing opportunities for teachers to interact with one another regarding specific innovations (Little, 1982; 1984; Rozenholtz, 1985), and taking steps to ensure that time for such interaction is buffered from logistical barriers and other intrusions (Joyce & Showers, 1988; Little, 1982; Rozenholtz, 1985; Wellisch, et al., 1978) are school-wide strategies that have been shown to be effective in indirectly influencing teachers' actions. These data suggest that principals' strategies (Component 2) directed at fostering teacher-teacher interaction (Component 3) are a potentially powerful impetus for change in classroom practice.

**Influences on Principals' Actions:** Leithwood, et al. (in press) constructed a useful model for describing the nature, causes and consequences of principals' actions. The model stipulates that principals' actions are predominantly determined by principals' mental processes (Component 1b) which are a consequence of various external influences (e.g., in-service activities, day-to-day events, interaction with supervisors, etc.) (Component 1a).

Principals' knowledge of an innovation is a potentially powerful predictor of its adoption and implementation in the school. Leithwood and Stager (1986; 1989) have shown that principals' that were higher in "problem-relevant knowledge" were more able to solve unstructured or "ill-defined" problems in their schools. High and Achilles (1986), in a study comparing perceptions of teachers about principal "influence gaining behaviours", found that "principal-as-expert" (defined by instructional expertise) was rated among the highest influences. Hall (1987b) found that principals' knowledge, concern and tone (Component 1b) are key antecedent variables affecting the principal's actions, which, in turn, influenced school climate variables.

In addition to problem solving processes and knowledge, other mental processes or states, such as principals' values, beliefs and attitudes, have been identified as predictors of principal practice. Cousins (1988) found that principals' attitudes toward appraisal were predictive of the extent to which they used data concerning their own performance for purposes of professional development. Motivation for professional growth and experience and working knowledge were said to be antecedent variables having some influence. Begley (1988) found that for some principals the value "consequences for students" affected their decision to adopt an innovation involving microcomputers.

In the context of the present framework, then, it is reasonable to link influences on principals (Component 1), defined in terms of external influences and internal mental processes or states, to principal practices (Component 2).

**Additional Considerations:** Two considerations are fundamental to the proposed framework. First, the flow of influence is not necessarily unidirectional (i.e., from left to right in Figure 1). The condition of any given component in this conceptual scheme can influence prior components in the sequence. For example, limited observable success in stimulating collegiality among staff might prompt a principal to adopt different, perhaps more intensive tactics.

A second consideration is that the proposed chain of influence occurs within the context of a school culture which may be influenced by, and/or may influence, any of the components in the framework. School culture (Component 6), or "ethos" is generally taken to imply shared values among and within stakeholder groups associated with the school (administrators, teachers, students, parents, etc.). Shared beliefs and values and norms of operation are encompassed by this term. Although the term is somewhat abstract, many studies have shown that culture variables have accounted for variation in school effectiveness (Rosenholtz, 1989; Rossman, Corbett & Firestone, 1985; Rutter, Maughan, Mortimer & Ouston, 1979). Cultural norms are suggested to have powerful influences on decision making and curriculum activities within the school.

## 3. METHOD

### 3.1 SETTING

The context for the study was a three year dissemination project designed to upgrade the problem-solving skills of Junior Division pupils in a large suburban school system in Central Ontario. In the first year of the project the focus of in-service was grade 4 teachers, teacher-librarians, and principals. Forty schools participated in the project which was run in collaboration with a committee of educators from the school system (dissemination team). Grade 4 teachers and teacher librarians attended two central workshops on teaching comparative thinking. In one half of the schools a "key teacher" attended the workshop on the understanding that they would disseminate to fellow staff knowledge and skills from the workshop. In the other half of the schools all grade 4 teachers attended. Pre and posttest student achievement data were collected by grade 4 teachers in all of the project schools. A report on this project is available elsewhere (Ross, in press).

In the second year of the project, the year for which Transfer Grant funding applies, in-service was provided by the dissemination team to teachers new to grade 4, grade 5 teachers, teacher-librarians and principals. The main thrust of the year's in-service was teaching decision making in grade 5. Grade 4 teachers involved in all project phases in the previous year were given an opportunity to attend a "refresher" central workshop session. Other grade 4 teachers were given a central workshop early in the school year that provided them with a demonstration of how to teach comparative thinking skills, background information and required materials. Grade 5 teachers were given two central workshops: one early in the school year focused on remedial strategies for comparative thinking and teaching comparative writing; and a second at mid-year on how to teach decision making. Teacher-librarians attended the first grade 5 workshop and received additional input on their role as "partners" in supporting teacher implementation of the innovation. All participants were encouraged to provide peer support for colleagues involved in the project in their schools.

Principals also attended the central workshops and learned about teaching thinking skills in the Junior Division. They received additional input concerning their role as instructional leaders. Principals were provided with a rationale and encouraged to foster teacher-teacher interaction within the school regarding teaching thinking skills.

## 3.2 DESIGN

### 3.2.1 Main Study

The basic research design used in the study was correlational. Large quantities of data were collected in over 40 schools and analyses were linked to the research questions and framework described above. Collected data included pre and posttest student achievement data, teacher and principal survey data and teacher and principal interview data. In this way, relationships between and among key antecedent, intervening and dependent variables could be identified and patterns of covariation among variables could be estimated. The unit of analysis for the main study was class.

### 3.2.2 Principal Treatment

A subgroup of principals was recruited to participate in a special project designed to assist in developing their skills as instructional leaders. These principals participated as a group in a set of activities designed to involve them in constructing a tool and developing strategies that would be useful in fostering collaboration among members of their staff.

The group was matched with a similar group of principals on the bases of school size, history (i.e., nature of previous involvement in this dissemination project), and geographic region (east, west) within the school system. The research design was a pretest-posttest, quasi-experimental design with two matched treatment groups (Knowledge Only and Knowledge Utilization). The unit of analysis for this substudy was the school.

*Knowledge Only Group*

Principals assigned to the Knowledge Only group were given two kinds of information.

1. Knowledge about the innovation. Student achievement expectations, characteristics of faithful implementation (teaching strategies associated with higher levels of student achievement), and procedures for assessing student performance were presented in the central workshops.

2. Knowledge about the role of principals in supporting and monitoring implementation. Evidence that teacher-teacher interaction enhances implementation and teacher change and specifics about the role of the principal in supporting and fostering collaboration in the school.

This treatment condition provided the "problem-relevant" knowledge that previous studies (e.g., Leithwood & Stager, 1986; 1989) found to be linked to effective problem solving by the principal. But no additional support was provided to Knowledge Only principals beyond the provision of information: They were left to their own devices to determine whether and how they would use this knowledge.

*Knowledge Use Group*

Principals recruited to this treatment group received the same information as principals in the first condition. In addition, they were required to develop personal action plans for using the problem-relevant knowledge. Members of this group: (1) identified steps to be taken to promote teacher-teacher interaction, (2) identified practical strategies for doing each step,

(3) developed action plans for their own schools, (4) put action plans into operation, (5) were given feedback and assistance in revising action plans, and (6) were provided with feedback about the effects of action plans on teacher and student outcomes.

Knowledge Use principals worked in collaboration with one of the principal investigators to develop an "innovation profile" using an adapted set of procedures from Leithwood & Montgomery (1987).[1] The product was a profile of growth in teacher-teacher interaction at the school level. Individual action plans subsequently were generated based on the growth schemes identified in the profile. The profile is discussed in more detail under Results Section 4.2.1.

## 3.3 SAMPLE

### 3.3.1 Main Study

Forty-two elementary schools participated in the main study. They ranged in size from 177 to 723 students and were geographically located in all regions of the school system. In each school data were collected from the principal, teachers with responsibility for teaching grade 5, and teacher librarians. The number of teachers participating was dependent upon the size of the school. This number ranged from 1 in several small schools to 4 in some large schools. In several cases, teachers were teaching split grade classes (i.e., grade 4/5 or grade 5/6).

### 3.3.2 Principal Treatment

Two matched groups of 21 schools were formed based on the matching criteria listed above (school size, history in the project, geographic region). Principals in the Knowledge Use group were invited to participate in the principal in-service focused on leadership development. Twelve of the 21 principals initially agreed to participate in the in-service program. Through the course of the program six principals dropped due to busy schedules and competing commitments.

The schools of the six principals remaining in the program were subsequently matched with six schools from the Knowledge Only group according to school size, geographic region, and prior history. The selection of this group was made after all data had been collected: availability of data from the school was another factor affecting selection.

Table 1 lists some of the identifying characteristics of each of the two treatment groups.

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[1] Innovation profiles are multi-level, multi-dimensional profiles of growth with several uses in the context of planned educational change. Applications include fostering the implementation of innovations, performance appraisal, professional development, and so forth. They are typically developed locally and, as a consequence, have the advantage of being sensitive to unique, context-specific user needs. See Leithwood and Montgomery (1987) for specific procedures and examples of applications.

## TABLE 1

## SAMPLE CHARACTERISTICS OF MATCHED TREATMENT GROUPS

| | Knowledge Use | | | | | | Knowledge Only | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 |
| Students | 723 | 241 | 519 | 409 | 220 | 613 | 617 | 309 | 556 | 646 | 219 | 514 |
| Teachers | 36 | 13 | 27 | 22 | 13 | 32 | 31 | 18 | 29 | 33 | 13 | 29 |
| Grade 5 Teachers* | 3 | 2 | 3 | 2 | 1 | 5 | 4 | 2 | 3 | 2 | 1 | 5 |
| Teacher-Librarians* | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| Grades | K-8 | K-8 | K-8 | K-6 | K-8 | K-8 | K-6 | K-8 | K-8 | K-8 | K-8 | K-6 |
| Region | E | W | E | W | E | W | W | E | E | W | E | W |

*Staff currently participating in the project

TABLE 2

INSTRUMENTS AND DATA COLLECTION SCHEME

| Framework Component | Data | Source | Covariate | Source | Collection Schedule | |
|---|---|---|---|---|---|---|
| | | | | | Pre | Post |
| 1. Influences on Principals | .Principal Structured Interview | .Principal | | | | ✓ |
| | .Teacher Structured Interview | .Teacher-Librarian<br>.Grade 5 Teachers | | | | ✓ |
| | .PPBI Self Report Form | .Principal | | | | ✓ |
| | .PPBI Colleague Form | .Teacher-Librarian<br>.Grade 5 Teachers | | | | ✓ |
| 2. Principal's Actions | .Principal Structured Interview | .Principal | | | | ✓ |
| | .Teacher Structured Interview | .Teacher-Librarian<br>.Grade 5 Teachers | | | | ✓ |
| | .Participant Observation | .Dissemination Team | | | | (✓)* |
| 3. Teacher-Teacher Interaction | .Principal Structured Interview | .Principal | | | | ✓ |
| | .Teacher Structured Interview | .Teacher-Librarian<br>.Grade 5 Teachers | | | | ✓ |
| | .Activity Records | .Teacher-Librarian<br>.Grade 5 Teachers | | | | (✓)* |
| 4. Teachers' Actions in the Classroom | .Principal Structured Interview | .Principal | | | | ✓ |
| | .Teacher Structured Interview | .Teacher-Librarian<br>.Grade 5 Teachers | | | | ✓ |
| | .Activity Records | .Teacher-Librarian<br>.Grade 5 Teachers | | | | (✓)* |
| 5. Student Growth in Thinking Skills | .Student Achievement Test | .Grade 5 Students | | | ✓ | ✓ |
| | | | .Teacher Style Survey | .Teacher Librarians<br>.Grade 5 Teachers | ✓ | |
| 6. School Culture | .School Characteristics Questionnaire | .Principal<br>.Teacher-Librarian<br>.Grade 5 Teachers | | | | ✓ |

(✓) Implies that data were collected during and subsequent to treatment.

## 3.4 INSTRUMENTS

A scheme linking instruments to components in the conceptual framework is outlined in Table 2. All instruments appear in Appendix A. In some cases descriptive response patterns are included on the actual instruments. The instruments are summarized below:

- **Student Achievement Instruments (Appendix A-1):** Two forms of an open-ended paper and pencil instrument were used to collect student achievement data. The instrument has been used extensively in research on thinking skills instruction (Maynes & Ross, 1984; Ross, 1981; 1988b; 1988c) and previous use indicates high inter-rater reliability in coding responses. Student tests were administered in February (pretest) and in May (posttest) following instruction in "decision making."

- **Teacher Style Survey (Appendix A-2):** A 16 item self report behavioural rating form based on the Teacher Efficacy Scale (Gibson and Dembo, 1984) was developed for data collection from teachers and teacher librarians. The instrument which purports to measure individual differences in teacher effectiveness consisted of only those items shown to load heavily on "teaching" and "personal" efficacy constructs. The instrument's construct validity has been demonstrated (e.g., Gibson & Dembo, 1984) and several studies have shown positive correlations among teacher efficacy, teacher practice and student achievement (for a detailed review of the literature see Ross, 1990).

- **Principal Profile-Based Instrument (PPBI) (Appendix A-3):** A 68 item behavioural rating form developed by Cousins and Leithwood (1987) for use in principal selection and appraisal served as a data collection device for principals. The instrument is based on previous empirical research on principal effectiveness (Leithwood & Montgomery, 1986) and has been demonstrated to be content valid (Cousins, Leithwood, 1987) and reliable (Cousins, 1989). The "Self Report" form was completed by principals and the "Colleague" form was completed by teacher-librarians and teachers with principals as the focus for ratings.

- **Principal's Structured Interview (Appendix A-4):** An interview schedule structured by the conceptual framework was developed for principals. The instrument focused on implementation activities that had occurred during the year, problems that staff had encountered, teacher collaboration on implementation, among other bits of information. The instrument was pilot tested by the research team in three schools from a different school system.

- **Teacher-Librarian/Teacher's Structured Interview (Appendices A-5-1 and A-5-2):** Interview schedules similar in structure to that used for principals were constructed and administered to teacher-librarians and teachers. The interviews focused on self report information about personal actions and beliefs as well as information about principal actions and teacher-teacher interaction. These interview guides were also pilot tested by the research team.

- **Teacher Activity Records (Appendix A-6):** As a measure of classroom activities, self report forms for teachers to fill out after teaching decision making for each of three weeks were developed. Two sets of forms corresponded to whether they had followed the schedule recommended at the workshop (Appendix A-6-1) or had engaged in some other implementation plan (Appendix A-6-2). On the latter form, in addition to asking for the same information, specific information concerning the nature of their implementation plan was requested. Other information collected on the forms was minutes spent on implementation, collaboration with colleagues and satisfaction with decision making involvement. Due to time limitations the research team was unable to pilot test these instruments in advance.

- **Teacher Librarian Activity Surveys (Appendix A-7):** Teacher librarians were also surveyed in parallel with teachers about their activities during the implementation. In particular, self report information about the extent to which they collaborated with grade 5 teachers on implementing the innovation was of interest.

- **School Characteristics Survey (Appendix A-8):** A 28 item questionnaire based on items drawn from Rozenholtz' (1989) study of teacher collaboration was constructed as a measure of school culture. The form was completed by principals, teachers and librarians. It addressed such issues as teacher evaluation, collaboration, commitment, task autonomy and discretion, shared teaching goals, school goal setting, socialization, isolation/cohesiveness and managing student behaviour. Reports on internal consistency for the scales from the Rosenholtz study were moderately favourable (Alpha ranging from .56 to .82).

## 3.5 PROCEDURE

### 3.5.1 Main Study

*Student Outcome and Survey Data*

As mentioned above, grade 5 teachers, teacher-librarians and principals attended two central workshops on teaching thinking skills, one in October and one in January. In the second workshop, the focus was on teaching decision making and participants were supplied with a resource package (Appendix B-1) that included a recommended schedule for implementation. (The package also included a rationale for teaching decision making, a growth scheme for student performance, examples of mini quizzes and tests, a scheme for marking tests and various decision making activities.) The recommended schedule suggested that three weeks (consecutive or distributed over three months) be devoted to teaching decision making. In each week, it was recommended that one half hour per day be devoted to instruction and practice, followed by a quiz at the end of the week. In successive weeks, students were to be given instruction that corresponded with higher levels on the growth scheme (see Appendix B-1).

At the session, participants were also made aware of plans for data collection. Grade 5 teachers were asked to administer and return pretest forms shortly after returning to their schools and prior to engaging in instruction concerning decision making. They were asked to randomly distribute to half the class Form A and to the other half, Form B (see Appendix A-1). A record sheet was provided to help ensure that students received the different form at the posttest interval.

Teachers and teacher-librarians were also asked to complete the Teacher Style Survey at the time of the pretest. The student pretests, record of test form administration, completed Teacher Style Surveys and anticipated schedule for teaching decision making were to be returned in confidence (in sealed envelopes) to the principal investigators care of a local system consultant (see Appendix B-2).

Teachers and teacher-librarians were also provided with Week 1 Activity Records (Appendix A-6 and A-7) at the workshop. These were to be completed and returned once instruction in decision making had commenced. Teachers had the option of following the schedule recommended at the workshop or of adopting their own plan of implementation (in practice most teachers followed the recommended schedule). The activity records provided the authors with an opportunity to monitor implementation activities. Upon the receipt of the completed Week 1 records, Week 2 Activity Records were then sent. This cycle continued for the Week 3 Activity Records. Teachers following the recommended schedule were to administer the posttests (ensuring that students received a different form) at the conclusion of Week 3 and to submit their package of posttest forms with the Week 3 Activity Form.

Central records enabled the researchers to identify teachers and teacher-librarians who had not submitted pretests and activity records within a reasonable amount of time. In order to prompt these participants into completing and returning forms, reminder memos were sent as the term progressed (Appendix B-3). In these and in other correspondence (Appendix B-3) attached to Activity Records participants were reminded of promises of confidentiality.

### *Site Visits*

Site visits were made to all schools participating in the project. The purpose of the visit was to interview the principal, teacher-librarian, and however many grade 5 teachers there were implementing the decision making instruction. The visits were made in slightly over one month (April-June) by two research officers and one of the principal investigators. A standard procedure for site visits was developed and documented for the research team (Appendix B-4). In the normal case, principals were contacted by telephone. During the telephone conversations questions were answered concerning the nature and purpose of the visits. In order to standardize responses to these questions, support materials were made available to the research officer (Appendix B-4b & 4c). In most cases, principals agreed on behalf of their staff to a suitable date. In a few instances, principals requested an opportunity to discuss the visit with staff prior to consenting. For the most part, the level of compliance on behalf of principals was very high as evidenced by their efforts to free up staff for 30 to 45 minute periods to be interviewed. Slight resistance toward the visits on behalf of some principals appeared to stem from the fact that May was a very busy time of year for the schools and because some teachers had not yet completed their implementation plans. Assurances that no more than one half day would be required and that it did not matter if everyone had completed the decision making instruction were usually sufficient to satisfy principals.

Five schools declined the opportunity for the site visit because no one had implemented the curriculum and they believed they had nothing to report at the visit. Site visits were made to 37 of the 42 schools (88%).

Having booked a date, a letter was sent to school staff describing the visit (Appendix B-4d) and a decision was made about how many researchers should visit the school. The team's goals were to spend no more that one half day in a single school, to conduct the interviews in an unobtrusive fashion and to visit two schools per day on average. This meant that one, two or three researchers would visit a given school depending upon how many interviews were required. All interviews were one to one, private, lasted from 15 to 60 minutes and took place in any number of locations throughout the school (e.g., principal's or vice-principal's office, teacher's classroom, empty classroom, nursing station, hallway, janitor's closet, and in many cases for the teacher-librarian's, in the library). With the interviewee's permission the session was audio tape recorded. In cases where more than one researcher made the visit, interviews were often scheduled simultaneously but in some cases, a teacher's class would be covered by one researcher while the other conducted the interview (both research officers were qualified teachers).

At the conclusion of the interview the interviewee was presented with the Principal Profile-Based Instrument and the School Characteristics Survey. In many cases, interviewees decided to complete the forms on the spot. Others chose to do so at a later time and were provided with an addressed envelope that they could seal and return. From central records researchers were able to identify missing information from the interviewee prior to the visit (e.g., Teacher Style Survey, activity forms, posttests). The appropriate material was given to the interviewee if he/she had misplaced it and a request was made to complete the necessary forms/tasks and submit the information as soon as was convenient.

At some point following the interview the researcher reviewed field notes and ensured that legible, handwritten responses appeared under each question on the actual structured interview guide. The tape recording was helpful in resolving uncertainties in the field notes and for identifying suitable quotations to be used in the analysis.

In June, follow up letters (Appendix B-3i & 3j) were sent to those staff with missing information. Toward the year's end participants who had still not submitted required information were contacted individually by telephone and asked to comply. Table 3 shows the extent to which data were obtained from all sources.

### 3.5.2 Principal Treatment

In parallel with teacher in-service and implementation activities principals were recruited for separate instructional leadership workshops. The principals in the Knowledge Use group were contacted by letter (Appendix B-5a), and invited to attend an initial workshop designed to provide more detail and to lay out expectations concerning participation in the program. This meeting was scheduled for November. At the workshop, principals were reminded about the benefits of collaboration in their schools, provided with the framework for the project (Figure 1) and introduced to the technology of developing innovation profiles. Fourteen of the twenty-one principals (67%) attended the meeting. A form was provided upon which they were to indicate their level of commitment to the project (Appendix B-5c). This form was to be returned to the principal investigator at the principal's earliest convenience. A separate memo with a commitment form attached was sent to principals that were unable to attend the meeting (Appendix B-5b). Both principals attending the meeting and those unable to were supplied with a task (Appendix B-6a) to be completed prior to the January meeting.

Commitment to participate in the program was received from eleven of the principals and a second workshop was scheduled for January. Six principals submitted commitment forms indicating why they declined to participate in the program. The reasons varied, but for most the issue was a question of available time or competing commitments:

> My school and board commitments, including chairing a committee to review our self-contained special education classes, make this a difficult year to take on extra responsibilities.

One principal indicated that he would be changing schools and another was not interested in the program described:

> I limit participation to projects which, by virtue of the accompanying literature, convince me that from a cost effectiveness standpoint the time spent would benefit staff. I'm not convinced.

At the second workshop, a draft of a profile of teacher collaboration was developed by the group. The principals also gave some thought to identifying obstacles that might stand in the way of fostering collaboration in the schools. The profile information was taken away by the principal investigator and processed into a draft summary. Another meeting was scheduled for late January to revise the instrument and to develop school plans (see Appendix B-5f). The draft instrument was distributed ahead of time and the principals brought with them their comments and suggestions. For the most part the meeting was a collaborative work session with the profile dimensions and levels within dimensions providing the focus for debate. The revised profile was subsequently produced and distributed (see Appendix B-6c).

Principals were instructed to develop and submit plans for their own schools once the revised profile had been received. In the plans, principals selected for a focus one or several dimensions from the profile. They identified current practice, desired practice, how they planned to help their staff move toward desired practice and what obstacles they believed required serious consideration (see Appendix B-6f). Principals were given roughly two months to implement their plans and were then summoned to a debriefing session in April. Five principals submitted written plans and a sixth continued with the program without submitting a plan. The remaining principals dropped out of the program due primarily to lack of available time. In the debriefing session, the participants talked about their progress in implementing their plans and shared with the group concerns and experiences. Additional input regarding profile revision was also provided. This meeting marked the end of the principal treatment. The schools of the principals in the Knowledge Use group were visited along with all other schools during the site visits described above.

## TABLE 3

## RECORD OF DATA COLLECTED

| Instrument | N | Sample |
|---|---|---|
| Student Pretest* | 1685 | grade 5 students, 84 classes |
| Student Posttest* | 1539 | grade 5 students, 72 classes |
| Teacher Style Survey | 121 | teachers, librarians, principals |
| Principal Style Survey | 161 | teachers, librarians, principals |
| Interview Principals | 35 | principals |
| Interview Librarians | 30 | librarians |
| Interview Teachers | 84 | teachers |
| Activity Records: | | |
| Teachers: Week 1 | 58 | teachers |
| Week 2 | 53 | teachers |
| Week 3 | 53 | teachers |
| Librarians: Week 1 | 26 | librarians |
| Week 2 | 26 | librarians |
| Week 3 | 21 | librarians |

*Note: The total number of students completing either pre or posttest was 1990; completing pre and posttest was 1362.

## 3.6 DATA PROCESSING AND PLAN OF ANALYSIS

### 3.6.1 Student Data

Student pretests and posttests were marked independently by two research officers. The marking scheme, was the one given to teachers at the central workshops (see Appendix B-1, Handout 6).

The markers were given a training session to develop their knowledge and skills in marking decision making tests. They were then provided with a sample of tests and required to mark them independently. Having completed the sample, the markers compared their evaluations for agreement. They discussed discrepancies and attempted to resolve them. They then met with the principal investigators to discuss unresolved discrepancies and any other concerns about the task that might have arisen. A set of instructions was then prepared and markers then independently graded all remaining student responses. They took care to record marks on separate forms and to not write on the original student response forms. With the aid of a computer data entry program, the markers were readily able to identify and record discrepancies. Subsequently, these discrepancies were located and the markers attempted to resolve them. In practice, agreement between the markers was very high (98% for pretests and 94% for posttests) and they were able to resolve all discrepancies.

### 3.6.2 Quantitative Data Processing

Codebooks were developed for each instrument and all quantitative data were entered onto the computer with the aid of a data entry program. Data were stored in separate electronic files corresponding to instruments. Care was taken to include class and school identification information with each record in order to facilitate subsequent data aggregation. Data were later checked for errors by a random verification procedure.

### 3.6.3 Qualitative Data Processing

Field notes (handwritten notes written on actual interview schedules) from interviews served as the basis for analysis of the qualitative responses. Two sets of codes corresponding to principal and teacher/teacher-librarian interview data were developed by the principal investigators and subsequently "fleshed out" by a research officer responsible for the first pass at analysis. The field notes were coded by the research officer and then entered onto the computer with appropriate identifying information. Where uncertainty arose, audio tapes of the interviews were reviewed for clarification. The research officer also made note of particularly illustrative quotations to be used in describing and interpreting results later in this report.

### 3.6.4 Main Study Plan of Analysis

All data were initially analyzed using SPSSx file management and statistical analysis procedures. Raw data files were converted to SPSSx "system" files by a data analyst. A set of variables were constructed from the raw data to represent the components in the conceptual framework for the study (see Figure 1). Univariate distributions were displayed for all variables to give the principal investigators a sense of the statistical properties of the data, non response patterns, and so on.

Having constructed the set of variables, two master SPSSx system files were then created which represented the aggregation of all data to the class level. Class was selected as the unit of analysis for two reasons: (1) from the site visits it became clear that variability over classes was substantial and it did not seem wise to lose this information through the process of aggregation; and (2) from a statistical standpoint an initial sample size (prior to listwise deletion of missing data) of 88 classes compared favorably with the number of schools (38) for which data were available (i.e., increased ability to detect effects). Of course, in aggregating to the class level response variance is somewhat constrained for teacher-librarian and principal responses.

All variables were ordered within the system file by the conceptual framework and a massive intercorrelation matrix was produced. As a data reduction technique, the matrix was subdivided into the six components from the framework (Figure 1) and all statistically significant correlation coefficients were "highlighted" so that they could be easily identified.

Upon examining the correlation matrix the principal investigators identified "promising" variables to be used in statistical analyses to test the framework. A series of path analyses were conducted using the LISREL VI statistical program (Joreskog & Sorbom, 1981). Different variables were substituted for the various components. LISREL produced maximum likelihood estimates of path coefficients and error terms. In practice, the analyses were severely constrained by the availability of data since listwise deletion of missing data was used. This factor precluded the test of several models that were of interest from a substantive point of view. Other technical problems corresponded to the distribution of the variables. Given the nature of our data collection instruments we were unable to support the claim that our variables satisfied LISREL's assumption that variables are distributed multivariate normally.

The approach to analysis used was an iterative process of testing models, examining results and deciding, based strictly on substantive considerations, on further tests to be conducted. All analyses were guided by the use of the conceptual framework for the study. The resulting set of statistical models that we present below should be interpreted with caution due to the consideration mentioned.

### 3.6.5 Principal Treatment Plan of Analysis

In order to test for differences due to the principal treatment the same variables as described above were aggregated to the school level (N=38). Because the number of cases (12) for this analysis was prohibitively low, non-parametric statistical procedures and exploratory data analyses were used. Basically, the approach was one of testing for differences attributable to principal treatment in each of the components in the model. Kruskal-Wallis Oneway Analysis of variance was used.

# 4. RESULTS

## 4.1 RESPONSE PATTERNS

Univariate response patterns for most instruments are recorded on the actual documents appearing Appendix A. The reader is encouraged to turn to these appendices for information on response patterns at the level of individual items.

### 4.1.1 Growth in Student Performance -- Appendix A-1

Student growth over the three or four month period was significant. Gains in student performance from the pretest to posttest interval were about 3 points on the six point (0-5) scale as can be seen in Table 4. Markedly improved student performance could be observed on each component (alternatives, criteria, summarizing) of the marking scheme. On average, grade 5 students were able to identify alternatives, compare advantages and disadvantages and, relatively modestly, summarize their thinking following the curriculum implementation. For each sub-dimension of the scoring scheme, variation in student growth (as reflected by difference scores) was quite high. It should be noted that pretest scores were quite low, with a "floor effect" (many students scored zero on all dimensions) in evidence.

Table 4 also shows student performance broken down by gender and by test form. Some clear pretest and posttest differences can be observed for both gender (males with superior performance) and test form (responses to Form A being superior) but that these differences disappear when growth (in this case difference scores) is the dependent variable.

TABLE 4

GROWTH IN STUDENT PERFORMANCE BY GENDER AND BY TEST FORM

| | PRETEST | | | POSTTEST | | | (POST-PRE) DIFFERENCE | | |
|---|---|---|---|---|---|---|---|---|---|
| | $\bar{X}$ | SD | N | $\bar{X}$ | SD | N | $\bar{X}$ | SD | N |
| ALTERNATIVES (0-1) | | | | | | | | | |
| Overall | .22 | .42 | 1790 | .73 | .45 | 1510 | .48 | .57 | 1362 |
| Males | .26** | .44 | 888 | .72 | .45 | 765 | .52 | .56 | 688 |
| Females | .20** | .39 | 902 | .74 | .44 | 744 | .45 | .58 | 673 |
| Form A | .19* | .39 | 904 | .73 | .45 | 733 | .45 | .58 | 654 |
| Form B | .26* | .44 | 885 | .73 | .44 | 777 | .51 | .56 | 708 |
| CRITERIA (0-3) | | | | | | | | | |
| Overall | .86 | .77 | 1790 | 2.94 | 1.84 | 1510 | 2.03 | 1.89 | 1362 |
| Males | .93** | .83 | 888 | 2.89 | 1.80 | 765 | 2.04 | 1.90 | 688 |
| Females | .79** | .71 | 902 | 2.99 | 1.80 | 744 | 2.02 | 1.89 | 673 |
| Form A | .78** | .79 | 904 | 2.96 | 1.80 | 733 | 2.00 | 1.90 | 654 |
| Form B | .94** | .75 | 885 | 2.92 | 1.80 | 777 | 2.05 | 1.89 | 708 |
| SUMMARY (0-1) | | | | | | | | | |
| Overall | .03 | .17 | 1790 | .45 | .50 | 1510 | .39 | .51 | 1362 |
| Males | .03 | .18 | 888 | .45 | .50 | 765 | .40 | .51 | 688 |
| Females | .02 | .15 | 902 | .43 | .50 | 744 | .38 | .50 | 673 |
| Form A | .03 | .16 | 904 | .42 | .49 | 733 | .37 | .50 | 654 |
| Form B | .03 | .18 | 885 | .45 | .50 | 777 | .40 | .51 | 708 |
| TOTAL (0-5) | | | | | | | | | |
| Overall | 1.12 | 1.13 | 1790 | 4.10 | 2.54 | 1510 | 2.90 | 2.59 | 1362 |
| Males | 1.23** | 1.22 | 888 | 4.04 | 2.56 | 765 | 2.96 | 2.60 | 688 |
| Females | 1.01** | 1.02 | 902 | 4.17 | 2.52 | 744 | 2.84 | 2.59 | 673 |
| Form A | 1.01 | 1.12 | 904 | 4.10 | 2.54 | 733 | 2.82 | 2.80 | 654 |
| Form B | 1.24 | 1.12 | 885 | 4.11 | 2.54 | 777 | 2.97 | 2.98 | 708 |

*p<.01

**p<.001

TABLE 5

UNIVARIATE DISTRIBUTION AND CORRELATIONS
AMONG TEACHER EFFICACY VARIABLES

| | | | | | | Inter-Correlations | | |
|---|---|---|---|---|---|---|---|---|
| | $\overline{X}$ | SD | N | ITEMS | ALPHA | 1 | 2 | 3 |
| 1. Total Score | 3.95 | .41 | 119 | 16 | .51 | --- | | |
| 2. Teaching Efficacy | 3.36 | .71 | 119 | 7 | .61 | $.50^{**}$ | --- | |
| 3. Personal Efficacy | 4.36 | .59 | 119 | 9 | .74 | $.65^{**}$ | $-.22^{*}$ | --- |

$^{*}p<.01$

$^{**}p<.001$

## TABLE 6

### UNIVARIATE DISTRIBUTIONS AND CORRELATIONS AMONG PPBI TOTAL AND SUBSCALES

| | $\overline{X}$ | SD | N | ITEMS | ALPHA | Inter-Correlations | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 1. PTOTAL | 4.93 | .78 | 121 | 68 | .97 | --- | | | | | | | | | | | | |
| 2. PGOALS | 5.19 | .78 | 121 | 13 | .93 | .84 | --- | | | | | | | | | | | |
| 3. PG1 | 5.18 | .87 | 121 | 5 | .89 | .79 | .94 | --- | | | | | | | | | | |
| 4. PG2 | 5.29 | .74 | 121 | 4 | .85 | .75 | .88 | .82 | --- | | | | | | | | | |
| 5. PG3 | 5.12 | .99 | 121 | 4 | .89 | .71 | .87 | .69 | .62 | --- | | | | | | | | |
| 6. PSTRAT | 4.93 | .82 | 121 | 30 | .95 | .95 | .72 | .67 | .65 | .63 | --- | | | | | | | |
| 7. PS1 | 5.06 | .86 | 121 | 10 | .88 | .71 | .49 | .46 | .42 | .45 | .82 | --- | | | | | | |
| 8. PS2 | 4.03 | 1.13 | 121 | 5 | .88 | .88 | .66 | .63 | .57 | .59 | .87 | .66 | --- | | | | | |
| 9. PS3 | 4.79 | 1.05 | 121 | 5 | .85 | .81 | .57 | .53 | .55 | .47 | .83 | .54 | .65 | --- | | | | |
| 10. PS4 | 5.03 | .96 | 121 | 7 | .90 | .86 | .75 | .70 | .67 | .66 | .86 | .54 | .74 | .69 | --- | | | |
| 11. PS5 | 4.97 | 1.20 | 121 | 3 | .88 | .61 | .47 | .41 | .44 | .42 | .68 | .41 | .48 | .66 | .51 | --- | | |
| 12. PFACT | 4.74 | .96 | 121 | 19 | .96 | .93 | .71 | .68 | .64 | .57 | .82 | .55 | .83 | .74 | .75 | .49 | --- | |
| 13. PDECM | 5.07 | .86 | 121 | 6 | .90 | .82 | .68 | .66 | .66 | .53 | .71 | .53 | .64 | .67 | .68 | .38 | .77 | --- |

Note: All correlations are statistically significant $p < .001$

### 4.1.2 Teacher Efficacy -- Appendix A-2

The Teacher style survey was completed by 89 teachers and 30 librarians. Responses to the instrument were somewhat different than expected from previous research. As expected, median responses for the personal teaching efficacy construct were toward the high end of scale and teaching efficacy scores were somewhat lower. Table 5 shows univariate distributions for the total score and personal and teaching subscales in addition to correlations among them.

### 4.1.3 Principal Effectiveness -- Appendix A-3

The PPBI (Principal Style Survey) was completed by 66 teachers, 24 librarians (colleague form) and 31 principals (self report form). Table 6 displays the mean responses to the instrument in terms of its total score and various subscales. Intercorrelations among subscales and reliability coefficients are also presented. As with other studies (Cousins & Leithwood, 1987; Cousins, 1989) the instrument was observed to be highly reliable. Also, the finding that colleague scores were somewhat lower than principal self ratings is consistent with data reported by Cousins (1989).

### 4.1.4 Principal Interview Responses -- Appendix A-4

Thirty-five principals were interviewed during site visits. Considerable variation was observed in the extent to which they were knowledgeable about the project. In several cases principals cautioned that their responses to questions were speculative. In many schools, teachers' plans for implementing the thinking skills curriculum were not shared with principals and principals were unable to comment on whether changes had been made as a consequence.

They were, however, able to provide some insight into problems that they perceived teachers to be having with implementation . The most frequently mentioned concerns were:

- the curriculum was found to be too structured,
- disagreement over wording on student achievement tests,
- split grade structure was an inconvenience,
- conflict with other activities.

Principals varied in their beliefs about whether collaboration was happening among staff. They suggested that some teachers were collaborating with the librarians and among themselves but that such collaboration was generally restricted to planning activities. According to one principal:

> This school is very involved in partnering with the librarian but also with various grades, high school classes and trainably mentally retarded classes. Teachers work a lot together on this aspect of partnering.

But another indicated that:

> Usually teachers work individually. Not much sharing or spirit in the school. The teachers have been teaching 20 years or so and are very set in their ways and have no spark or energy. Not open to new ways of teaching.

Again, they were forced to speculate considerably about these issues.

Principals indicated throughout the interviews a number of actions that they had taken to support the project. These included the establishment of groups and committees; covering classes or arranging supply teachers; and arranging for teachers to meet together. Principals did not indicate that they were involved at the level of setting expectations or rewarding and/or monitoring collaboration. As one put it "it's as much my fault as it is theirs because I did not emphasize thinking skills as a priority."

They also identified a number of obstacles to collaboration in the school concerning teaching thinking skills. The most frequently reported obstacles were:

- competing priorities in the school,
- physical separation of classrooms (sometimes this meant portables versus building classrooms),
- conflicting teacher schedules,
- conflicting teaching styles,
- librarian works part time and is relatively inaccessible,
- expectations for collaboration not clear,
- lack of staff to work with (due to others opting not to participate),
- teachers not sold on decision making curriculum,
- partnering units not scheduled at conducive times,
- differential level of skill in teaching decision-making among grade 5 teachers.

#### 4.1.5 Teacher/Librarian Interview Responses -- Appendix A-5

For the most part, teachers and teacher librarians were able to articulate plans for implementation and to comment on their progress. Some indicated that plans had not been implemented as intended due to various obstacles and events that may have occurred throughout the school. The most frequently indicated problems encountered in teaching thinking skills included:

- no room in timetable,
- conflict with other worthwhile activities,
- curriculum too difficult for kids to learn,
- conflict with long range plans,
- split grades inconvenient,
- disagreement over wording in student achievement tests,
- not enough support materials,
- boring for kids,
- time consuming in class,
- too hard for teachers to teach.

The level of collaboration among teachers on teaching thinking skills was not high. These data corroborated the principals' impressions as most collaboration centred around objective setting or planning activities. Some teachers wondered why researchers were interested in collaboration. They did not perceive it as an expectation of the project and were concerned that they had not received any direction concerning this mode of implementing the curriculum. When asked about obstacles standing in the way of collaboration several were listed. The most frequently mentioned were:

- teachers schedules conflict,
- teachers do not normally interact regarding instruction,
- competing priorities,
- expectations not clear (no reason to involve others),
- absences,
- conflicting teaching styles,
- not suitable program/not sold on decision making,
- classrooms physically separated,
- partnering units not scheduled at conducive times,
- differential level among grade 5 staff of understanding or skill in teaching thinking skills.

Several quotations help to bring to life some of the obstacles that teachers perceived to be inhibitory:

> There is never a time when you can get together.
>
> It's hard to ask someone who is very busy to take time to do one more thing.
>
> To learn it, be sure of it, and teach it that quickly is hard.
>
> Other teachers doing things for so long by themselves that they are set in their ways.
>
> It seems a shame when you have three teachers teaching grade 5 and we're all doing the same stuff and we're all doing our planning--hours of work--we could save so much time. It's too bad it can't be better organized.
>
> Teachers don't see how to fit me in and I don't see how to fit me in. (teacher librarian)
>
> How are you going to fit this in after making your long range plans and still have time to do everything else?
>
> I'd have to do most of the work anyway so why share with someone and do all the work? Is this investment worthwhile?
>
> I did my own lessons because I knew what my students were studying, I knew what I wanted my students to learn for each topic and I worked decision making in.

It becomes apparent that teachers commitment to the curriculum was highly variable. Whereas some were very much interested in working it in to their long range plans and saw an opportunity to cover the same content but from a thinking skills perspective, many looked at the two objectives as being separate and non-interrelated. The following response to a student's suggestion supports this claim.

- This [deciding on a unit between USA and the USSR] would be a really good time where we could use the thinking skills idea and we could discuss it all and put categories and work it all out. (student as quoted by the teacher)

- No, I think we've given enough time to that. It's a good idea but we won't be doing that right now. (teacher)

### 4.1.6 Teacher Activity Records -- Appendix A-6

The number of teachers submitting Week 1 forms was relatively low (66%) and was seen to drop for Weeks 2 and 3 (60%). Without the concerted effort to encourage teachers to respond (described above) these response rates may have been substantially lower yet. With a 86% response rate for the student posttest (also following considerable encouragement) it seems likely that teachers were reluctant to keep up with the paperwork demands of the project. While they were willing to send along student data many did not wish to complete and return activity forms. Site visits suggested that the reason for this outcome was lack of time available in the face of many other competing demands.

The data received showed that, on average, teachers spent about 30 minutes per day teaching thinking skills (as recommended). Variability in responses was quite high with the majority of teachers implementing the curriculum between 15 and 45 minutes per day. Appendix 6-1a shows that teachers were generally satisfied with their teaching of decision making and that, in general, they tended to work alone (or to a modest extent with teacher-librarians) in delivering and assessing student work. Some collaboration albeit modest, with librarians and other teachers was apparent for objective setting and planning activities. Principals were largely uninvolved at this level of participation.

Teachers were inclined to meet with peers in a wide variety of school settings, including prep time, recess, before and after school and at lunch. Most indicated that they were satisfied with the level of involvement they had in implementation decisions.

The response patterns were quite similar over Activity Records for each of the three weeks.

### 4.1.7 Teacher-Librarian Activity Records -- Appendix A-7

Response rates for teacher-librarians submitting activity forms was somewhat higher than that for teachers. Seventy-eight percent of the librarians completed Week 1 and 2 Records, but that dropped to 64 percent for the Week 3 report. The most frequently circled response concerning their level of involvement in decisions about teaching thinking skills was "highly involved." The mean response, however, suggested that, on average, librarians were only slightly to moderately involved. Librarians indicated they worked predominantly with one teacher only or with one teacher more frequently than with others. Very few indicated that they worked about equally with all grade 5 teachers in the project. A significant number (about one third) of the librarians did not work with the grade 5 teachers on teaching decision making. (Presumably they worked with grade 4 teachers who had been involved in the project in the previous or current year.) It is interesting to note that librarians seemed relatively dissatisfied with their involvement in helping grade 5 teachers implement decision making curricula.

Response patterns for Activity Records were virtually the same for each of the three weeks although some variation was observed concerning whom the librarian worked with (see Appendix A-7).

### 4.1.8 School Characteristics Survey -- Appendix A-8

The measure of school culture used in the study showed that perceptions about values shared by staff were relatively positive (see Table 7). Sixty-three teachers, 24 librarians and 34 principals completed the School Characteristics scale. The average total score on the instrument was 4.7 (Std. Dev. = .78) and internal consistency found was to be quite high (Cronbach's alpha = .94). There were no differences attributable to organizational role.

Three items on the survey met with relatively less agreement: Exerting peer pressure on fellow staff performing at less than satisfactory levels, explicit statement of school goals and participation in determining in-service were items in the question.

TABLE 7

UNIVARIATE DISTRIBUTION AND CORRELATIONS
AMONG SCHOOL CULTURE VARIABLES

| | | | | | | INTER-CORRELATIONS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $\overline{X}$ | SD | N | ITEMS | ALPHA | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1. Total Score (STOTAL) | 4.7 | .69 | 121 | 28 | .94 | --- | | | | | | | | | | |
| 2. Teacher Commitment | 4.6 | 1.08 | 121 | 2 | .84 | .83 | --- | | | | | | | | | |
| 3. Task Autonomy | 5.2 | .67 | 121 | 2 | .43 | .49 | .44 | --- | | | | | | | | |
| 4. Shared Teaching Goals | 4.5 | .71 | 121 | 5 | .66 | .79 | .62 | .21 | --- | | | | | | | |
| 5. School Goal Setting | 4.3 | 1.26 | 121 | 2 | .85 | .83 | .63 | .40 | .59 | --- | | | | | | |
| 6. Collaboration-Isolation | 4.8 | .89 | 121 | 2 | .59 | .81 | .75 | .40 | .69 | .57 | --- | | | | | |
| 7. Teacher Evaluation | 5.2 | .87 | 121 | 2 | .80 | .79 | .57 | .43 | .59 | .66 | .58 | --- | | | | |
| 8. Socialization | 4.8 | .96 | 121 | 2 | .60 | .83 | .63 | .41 | .59 | .77 | .62 | .68 | --- | | | |
| 9. Managing Student Behavior | 4.6 | 1.13 | 120 | 2 | .82 | .69 | .59 | .21* | .48 | .49 | .59 | .36 | .47 | --- | | |
| 10. Learning Opportunities | 4.7 | .98 | 120 | 3 | .77 | .88 | .63 | .30 | .66 | .72 | .62 | .74 | .76 | .62 | --- | |
| 11. Psychic Rewards | 5.1 | .73 | 120 | 2 | .51 | .71 | .64 | .32 | .54 | .45 | .61 | .51 | .52 | .53 | .58 | --- |

Note: All correlations are statistically significant $p<.001$, except for * $p<.05$

TABLE 8

DESCRIPTION OF COMPOSITE VARIABLES
(AGGREGATED TO THE CLASS LEVEL)

| VARIABLE/CODE | DESCRIPTION | MEAN | SD | N | ITEMS | ALPHA |
|---|---|---|---|---|---|---|
| 1. Student Outcomes | | | | | | |
| /RESIDTOT | .Residual of Total Posttest score regressed on Total Pretest score<br>.From Student Achievement Tests: Appendix A-1 | -.047 | 2.13 | 71 | -- | -- |
| 2. Teacher Classroom Practice | | | | | | |
| /TOTMINC | .Average minutes spent daily during final week of teaching decision making<br>.From Week 3 Activity Record: Appendix A-6-1c<br>.Item 1 - Day 1 to 4 inclusive | 32.13 | 15.45 | 44 | 5 | .98 |
| /TTE | ."Teaching" subscale of Teacher Efficacy Scale<br>.From Teacher Style Survey: Appendix A-2<br>.Items 2,3,4,8,11,14,16<br>(Note: all items inverted except for 14) | 3.39 | .72 | 88 | 7 | .61 |
| 3. Teacher-Teacher Interaction | | | | | | |
| /TCOLLAB | .Average number of colleagues involved in all tasks (objective setting, planning, delivering, evalaution)<br>.From Week 1-3 Activity Record: Appendix A-6<br>.Item 2 (Check Who Was Involved) | 1.34 | .39 | 59 | 4 | .82 |
| /TPROFILE | .Average score on teacher-teacher interaction profile<br>.From Teacher/Librarian Interview Schedule: Appendix A-5-1<br>.Items 17-21 inclusive:<br>(Note: score expressed as proportion) | .41 | .20 | 65 | 5 | .81 |
| 4. Principal Actions | | | | | | |
| /PRINACT | .Total number of principal actions taken<br>.From Principal Interview Schedule: Appendix A-4<br>.Items 28-36 inclusive | 1.86 | 1.26 | 72 | 9 | .15 |
| 5. Influences on Principals | | | | | | |
| /PGOALS | .Goals subdimension of PPBI<br>.From PPBI: Appendix A-3<br>.Items 1-13 inclusive | 5.16 | .93 | 57 | 13 | .94 |
| /PG1 | .Use of Goals sub-subdimension<br>.From: PPBI Appendix A-3<br>.Items 10-13 inclusive | 5.11 | 1.09 | 57 | 4 | .89 |
| 6. School Culture | | | | | | |
| /STOTAL | .Total score<br>.From School Characteristics Survey: Appendix A-8<br>.Items 1-28 inclusive | 4.72 | .78 | 57 | 28 | .94 |

## 4.2 MAIN STUDY

### 4.2.1 Selected Variables

Some 103 variables were computed and, through the data reduction techniques described above, a small subset were selected for analysis. Table 8 describes the subset and shows the component of the framework to which they apply. Various univariate statistics are presented as well. Note that these data have been aggregated to the class level for the reasons discussed above (see Section 3.6.4).

The best measure of student growth appeared to be the residual of posttest total score regressed on the pretest total.[2] Student growth data were available from 71 classes.

Measures of classroom practice were somewhat wanting in this study. The selected best measure was the average number of minutes per day spent instructing decision making during the final week of implementation. Although reliability appeared to be high for this variable (alpha = .98) it was a self report measure of implementation and there were very few other measures to which it could be compared. As a consequence, the variable remains entirely uncorroborated. This observation places limits on one's confidence in the validity of the measure as an independent variable. Another problem with the variable was that a significant number of cases were missing due to reasons described above (see Section 3.5.1). This observation substantially reduced the number of cases available for analysis because listwise deletion of missing cases was used.

The teaching efficacy variable, a subscale of the teaching efficacy instrument, was selected as a covariate for growth in student performance because prior research has shown it to be significantly associated with student achievement (e.g., Poole & Okeafor, 1989). It was thought that this construct might explain a substantial portion of student growth in performance. The reliability of this variable was found to be comparatively low (alpha = .61) although not distressingly so.

Teacher-teacher interaction was measured by two variables. The first, called collaboration, was an indication of how many folks were involved, on average, in various implementation tasks. The mean score of this variable suggests that teachers worked in isolation for the most part. The variable turned out to be very reliable (alpha = .82), however. The other measure of interaction that appeared to be promising was derived from the Teacher-Teacher Interaction Profile developed by the Knowledge Use principal's group (see Figure 2; also see Appendix B-6b). This measure, expressed as an average proportion, shows that respondents believed that their staffs were generally toward the lower end of the profile of growth in collaboration when it came to implementing the decision making curriculum. This variable was also observed to be highly reliable (alpha = .81).

Principal interviews yielded a variable that was thought to be a good representation of principal actions. The coding scheme for the interview data (Appendix C-2a) allowed for the identification of 9 distinct actions that principals took to promote collaboration. The variable, appearing in Table 8, is merely the sum of the actions in which principals said they had engaged. As shown in the Table, this number was less than two on average. Moreover, the reliability of the variable was also observed to be quite low (alpha = .15). Unfortunately, the data were limited in the extent to which they yielded information about principals' actions. As such, the authors were forced to keep this variable as the sole representation of the construct.

---

[2] Note: The residual of student posttest score regressed on pretest score replaced the difference scores appearing in Table 4 in order to avoid bias due to "regression toward the mean."

| | OBJECTIVE SETTING | PLANNING | DELIVERY | FEEDBACK TO TEACHER | STUDENT EVALUATION |
|---|---|---|---|---|---|
| Optimal<br>↑ | joint decision by all teachers involved with grade 5 instruction to pursue same objectives | joint construction of plans by all teachers involved with grade 5 instruction | mobile teacher(s) and combined activity centres | peer coaching (observation and feedback involving all teachers involved with grade 5 instruction) | team marking by teachers |
| | joint decision by two teachers to pursue same objectives | joint construction of plans by two teachers | mobile teacher(s) or combined activity centres | peer coaching (observation and feedback involving two teachers) | |
| | partial agreement with other teacher(s) on objectives | | | | agreement on marking scheme by teachers |
| | inform other teacher(s) of different objectives | division of labour | exchanging materials | formal discussion of observations | |
| | | | | informal discussion of shared anecdotes | |
| | individual objective setting and informing of teacher-librarian | informal sharing of plans | individual delivery making use of outside resources | one-way observation and feedback | sharing marking schemes with teachers |
| | individual objective setting | | | informal relating of shared anecdotes | |
| Low | | individual planning | individual delivery | no feedback | individual marking |

Figure 2

Teacher-Teacher Interaction Profile

*the term "teacher" is used to denote both teachers and teacher-librarians

Two variables were selected from the PPBI as representations of influences on principals. Both measures pertain to the goals dimension of the instrument. The first variable corresponded to all items from this dimension, while the second was based on a subset of these items having to do with principals' use of goals. In both cases the average rating of principals was quite high (approaching "extremely likely" on the six point scale) and reliability was also shown to be very high.

Finally, as a measure of school culture, the average score on all 28 items of the School Characteristics Survey was selected. The items were subdivided into the original dimensions from the Rosenholtz (1989) study but very high internal consistency (alpha = .94) and promising relationships with other variables led to the selection of the total score variable as the best measure of school culture. The average rating of this variable suggested that staffs rated their school's characteristics favorably.

### 4.2.2 Intercorrelations

Table 9 shows the intercorrelations of the nine variables selected for further study. The matrix is discrepant from expectations in many respects. First, there appears to be only one variable correlated with student growth and that is the measure of teacher classroom practice, total minutes in the final week of teaching decision making. Even the magnitude of this correlation is less than expected. The measure of teacher efficacy, selected as a covariate of student growth, was unexpectedly found to be negatively associated with student growth, and not correlated with teacher classroom practice. These data are not consistent with findings from previous research. It is very evident in Table 9 that no other measures were found to correlate with growth in student performance.

Although the teacher-teacher interaction variables correlated positively with one another they were shown to relate to other variables in unanticipated ways. First, however, expected positive correlations with principals' actions, influences on principals and school culture were observed although in all cases these relationships were very modest. Second, they correlated negatively (albeit moderately) with teacher classroom practice. According to this finding, the more collaboration involved in implementing the decision making curriculum the less likely were teachers to spend much time teaching it in the classroom, a finding which suggests that nonimplementation of thinking skills was the norm in the school. Increased collaboration among teachers in this educational setting may have reinforced support for nonimplementation in the same way that workers in industrial settings at times conspire to reduce production. This would help explain why teacher-teacher interaction did not correlate with student growth. More speculatively, the theory of nonimplementation as the norm might also help explain why teaching efficacy was negatively related to student achievement. It may be that teachers who were confident of their own ability to bring about student learning did not include thinking skills within their conception of desirable learning. Teachers who focused on transmission type objectives would be reinforced by standardized test results which measure these outcomes to the exclusion of others and by interaction with other teachers in the school who shared their views. An alternate explanation for the negative correlation between teaching efficacy and student achievement of thinking skills might be that teachers who made a serious attempt to improve students' thinking might have had a more realistic understanding of how difficult it is to bring about substantial growth. They may have developed lower but more accurate beliefs in their own ability to bring about student change.

Actions that principals took to foster collaboration in implementing the curriculum were not found to be related to the goals they were perceived to hold for their schools nor their perceived use of goals. Finally, the school culture variable was found to be strongly related to perceptions of the principals' goals for the school. An association was also observed between this variable and one of the teacher-teacher interaction variables (profile score).

TABLE 9

INTERCORRELATION MATRIX - PAIRWISE (N=88)
(AGGREGATED TO CLASS LEVEL)

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Student Outcome | 1. RESIDTOT | --- | | | | | | | | |
| Teacher Classroom Practice | 2. TOTMINC | $.29^{*}$ | --- | | | | | | | |
| | 3. TTE | $-.26^{*}$ | .11 | --- | | | | | | |
| Teacher-Teacher Interaction | 4. TCOLLAB | -.04 | $-.24^{*}$ | .07 | --- | | | | | |
| | 5. TPROFILE | -.07 | -.14 | $-.26^{*}$ | $.55^{**}$ | --- | | | | |
| Principal Actions | 6. PRINACT | -.03 | -.08 | .04 | .03 | $.24^{*}$ | --- | | | |
| Influences on Principals | 7. PGOALS | -.06 | -.13 | -.05 | $.24^{*}$ | .12 | .14 | --- | | |
| | 8. PG1 | .03 | -.12 | -.04 | $.22^{*}$ | .06 | .11 | $.95^{**}$ | --- | |
| School Culture | 9. STOTAL | -.16 | -.19 | .03 | $.26^{*}$ | .11 | .01 | $.72^{**}$ | $.70^{**}$ | --- |

$^{*}p<.05$

$^{**}p<.001$

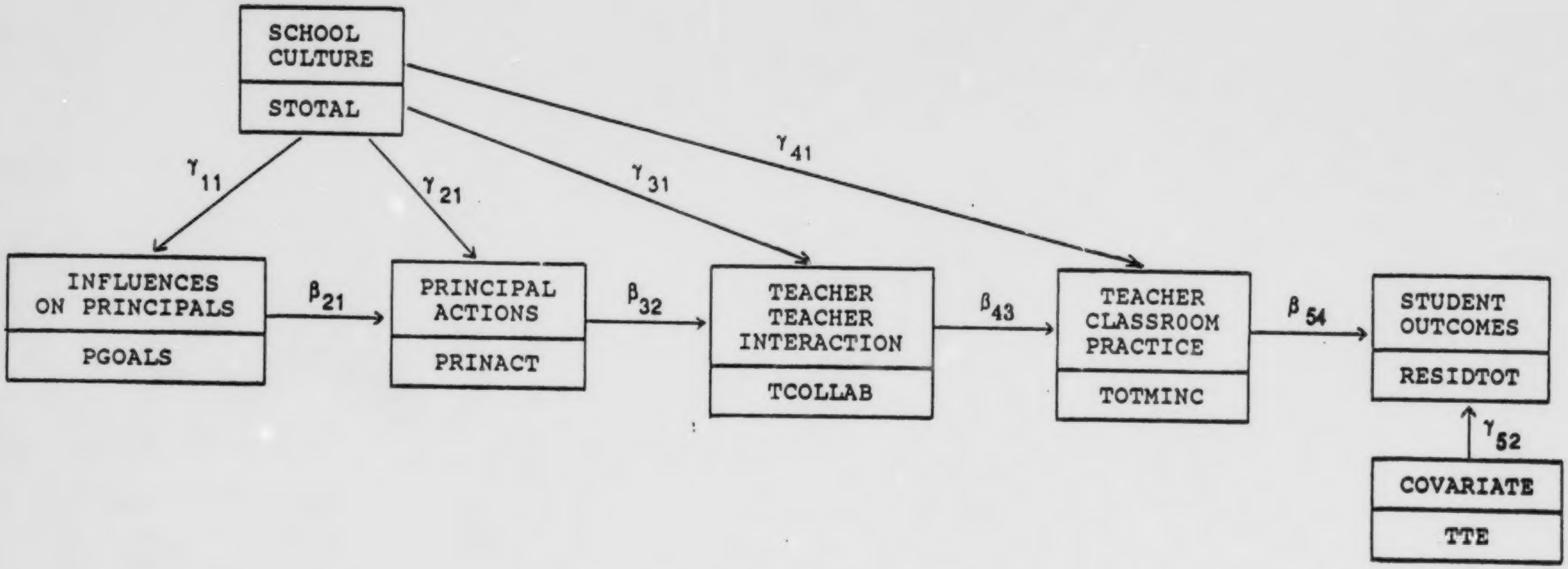

SCHOOL CULTURE
STOTAL
$\gamma_{11}$
$\gamma_{21}$
$\gamma_{31}$
$\gamma_{41}$
INFLUENCES ON PRINCIPALS
PGOALS
$\beta_{21}$
PRINCIPAL ACTIONS
PRINACT
$\beta_{32}$
TEACHER TEACHER INTERACTION
TCOLLAB
$\beta_{43}$
TEACHER CLASSROOM PRACTICE
TOTMINC
$\beta_{54}$
STUDENT OUTCOMES
RESIDTOT
$\gamma_{52}$
COVARIATE
TTE

Figure 3

Hypothesized Path Model of Principal's Role in Promoting Student Growth Through Fostering Collaboration

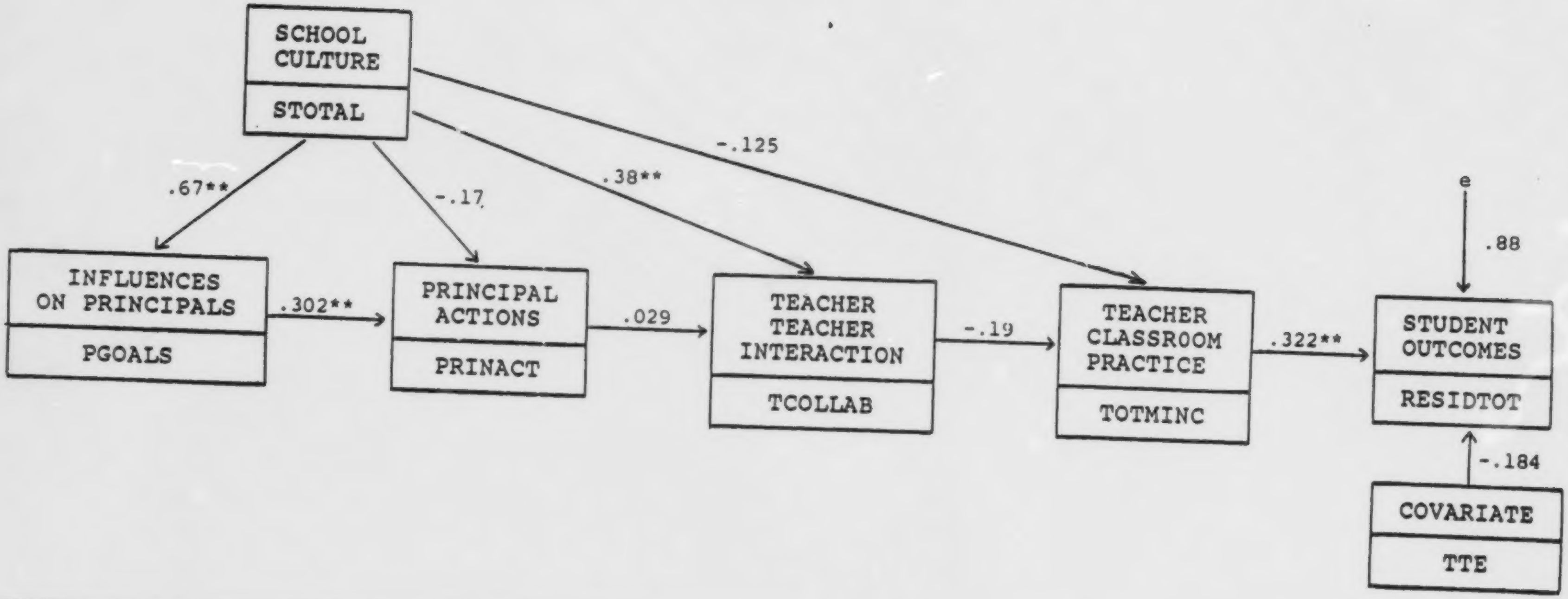
### 4.2.3 Path Models

Figure 3 shows a recursive path model believed to adequately represent the conceptual framework developed earlier (Figure 1). As mentioned before, it is likely that influence in the framework is not unidirectional (recursive). That is to say, for example, that principals actions might be found to depend somewhat on the extent to which teachers interact with one another in the school. The path model was able only to test for the unidirectional flow of influence because of limitations with the data. Specifically, the number of cases available for the analysis is severely restricted by the use of listwise deletion of missing data. As such, degrees of freedom are at a premium: the authors could ill afford to test non-recursive models under these circumstances.

Maximum likelihood estimates of path coefficients were employed in the path analyses using the LISREL VI program. A final set of four models was fit with variation corresponding to substitution of (1) teacher-teacher interaction variables (TCOLLAB, TPROFILE) and (2) influences on principals variables (PGOALS, PG1). The results of these four models appear in Figures 4a through 4d. In each case, nine path coefficients corresponding to seven variables (df=15) were estimated. Listwise deletion of missing cases preserved only a modest (31-32) number of cases for the models that were run. Without fail, all models were shown to fit the data: the variance-covariance matrix generated according to these structural parameters was shown not to differ significantly from the variance-covariance matrix generated by the actual variables (see Chi-square statistics and other goodness of fit indices in Figures 4a through 4d -- Joreskog & Sorbom, 1981). In each case, parameter estimates are somewhat predictable based on the pattern of intercorrelations apparent in Table 9.

Appearing in Figure 4a is the model with TCOLLAB and PGOALS serving as measures of teacher-teacher interaction and influences on principals, respectively. The influence of school culture on principal influences and teacher collaboration is apparent in the model. Principal's actions were also seen to depend moderately on goals they held for the school as perceived by staff. The effect on growth in student performance of teacher's classroom practice is clear. Examination of the total effects of antecedent variables on student outcome shows that the classroom practice variable was the only one to explain significant variation in the dependent variable. All other parameter estimates were found to account for non-significant amounts of variation in student growth.

The three variations of this model produced similar results. In substituting perceived use of goals (PG1) for the PPBI goals dimension (PGOALS) the pattern was virtually unchanged (Figure 4b): Loss of influence on principal actions was the only noticeable difference. The teacher-teacher interaction profile score (TPROFILE) was substituted for the number of colleagues involved in decision making (TCOLLAB). The results showed an increase (albeit non-significant) in the influence of principal actions on collaboration (Figure 4c). Again, the basic pattern of results described above persisted. This was also the case when the goals variables were switched for the influences on principals construct (Figure 4d).


SCHOOL CULTURE
STOTAL
.67**
-.17
.38**
-.125
INFLUENCES ON PRINCIPALS
PGOALS
.302**
PRINCIPAL ACTIONS
PRINACT
.029
TEACHER TEACHER INTERACTION
TCOLLAB
-.19
TEACHER CLASSROOM PRACTICE
TOTMINC
.322**
e
.88
STUDENT OUTCOMES
RESIDTOT
-.184
COVARIATE
TTE

GOODNESS OF FIT

$X^2$ = 7.26 df = 15 N.S.
GFI = .939
AGFI = .845
RMSR = .077

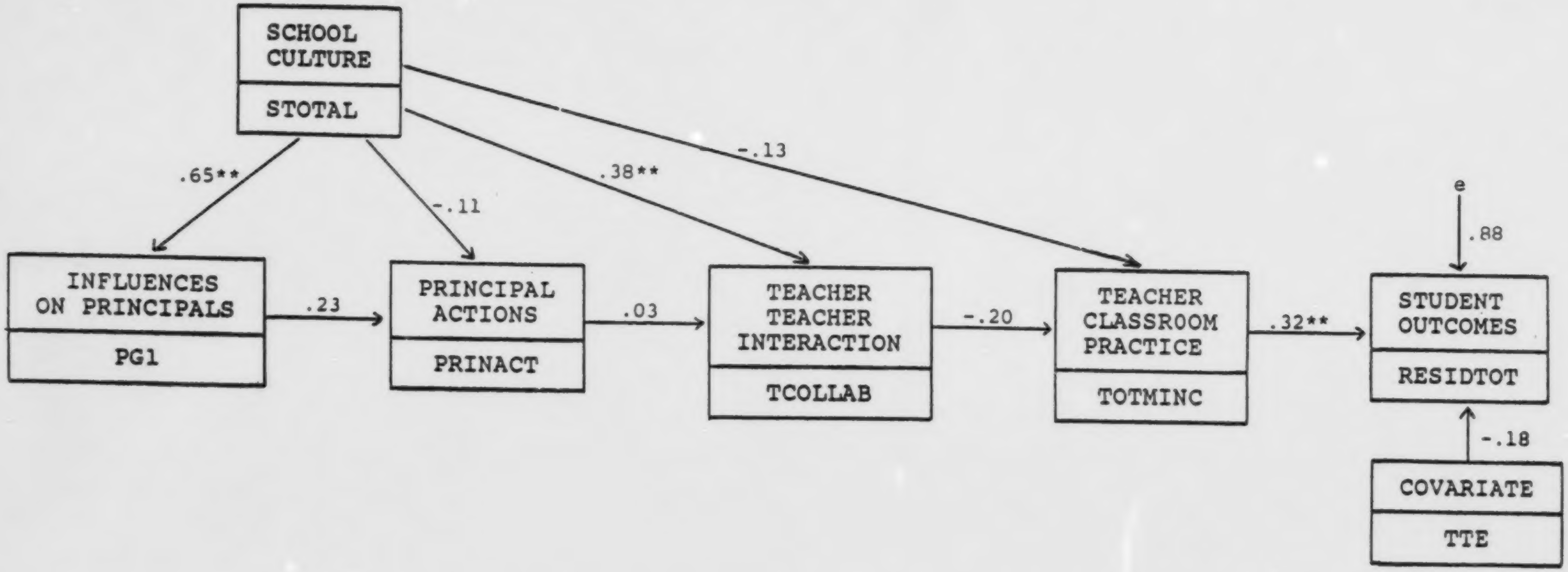
Note: ** p<.05
* approaching significance

EFFECTS ON GROWTH
IN STUDENT PERFORMANCE

| | Direct | Indirect | Total |
|---|---|---|---|
| TTE | -.18 | - | -.18 |
| TOTMINC | .32 | - | .32* |
| TCOLLAB | - | -.06 | -.06 |
| PRINACT | - | -.002 | -.002 |
| PGOALS | - | -.001 | -.001 |
| STOTAL | - | -.065 | -.065 |

Figure 4a

Path model of influence on growth in student performance
(Aggragated to class level, N=32, Maximum Likelihood Estimates)


SCHOOL CULTURE
STOTAL
.65**
-.11
.38**
-.13
INFLUENCES ON PRINCIPALS
PG1
.23
PRINCIPAL ACTIONS
PRINACT
.03
TEACHER TEACHER INTERACTION
TCOLLAB
-.20
TEACHER CLASSROOM PRACTICE
TOTMINC
.32**
e
.88
STUDENT OUTCOMES
RESIDTOT
-.18
COVARIATE
TTE

---

GOODNESS OF FIT

$X^2$ = 7.28 df = 15 N.S.
GFI = .939
AGFI = .845
RMSR = .079

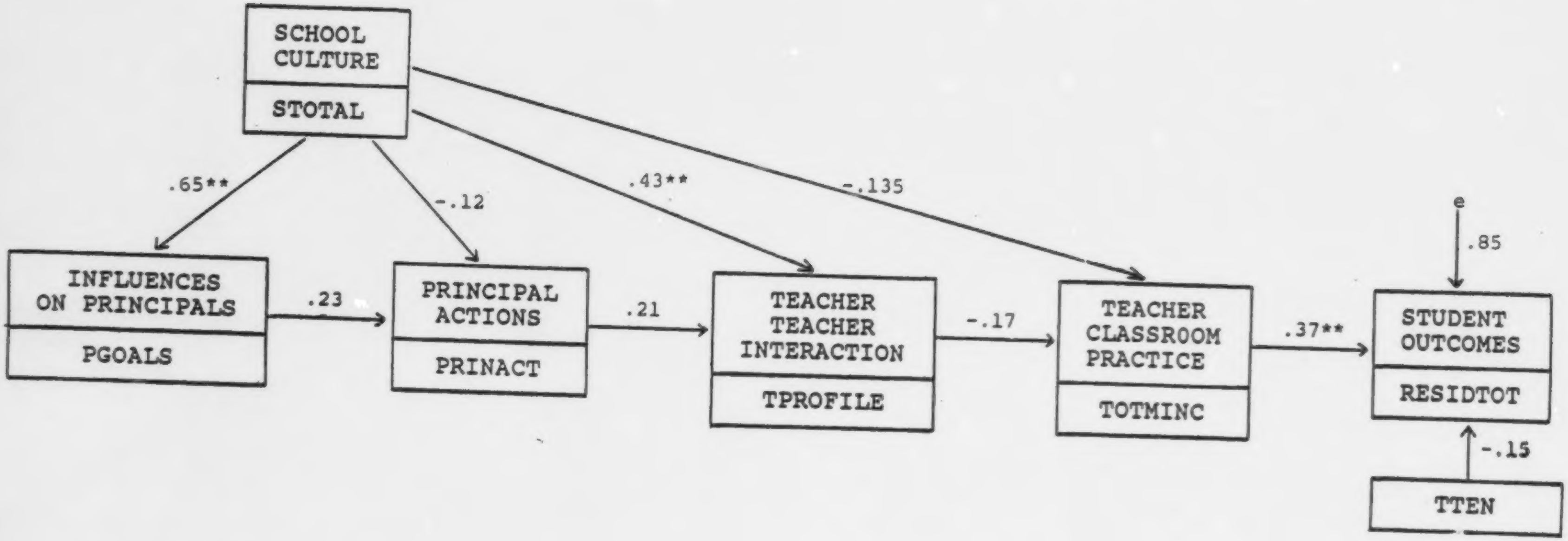
Note: ** p<.05
* approaching significance

EFFECTS ON GROWTH
IN STUDENT PERFORMANCE

| | Direct | Indirect | Total |
|---|---|---|---|
| TTE | -.18 | - | -.18 |
| TOTMINC | .32* | - | .32* |
| TCOLLAB | - | -.06 | -.06 |
| PRINACT | - | -.002 | -.002 |
| PG1 | - | 0 | 0 |
| STOTAL | - | -.07 | -07 |

Figure 4b

Path model of influence on growth in student performance
(PG1 substituted for PGOALS)
(Aggragated to class level, N=32, Maximum Likelihood Estimates)


SCHOOL CULTURE
STOTAL
.65**
-.12
.43**
-.135
INFLUENCES ON PRINCIPALS
PGOALS
.23
PRINCIPAL ACTIONS
PRINACT
.21
TEACHER TEACHER INTERACTION
TPROFILE
-.17
TEACHER CLASSROOM PRACTICE
TOTMINC
.37**
STUDENT OUTCOMES
RESIDTOT
e
.85
-.15
TTEN

GOODNESS OF FIT

$X^2$ = 7.74 df = 15 N.S.
GFI = .934
AGFI = .831
RMSR = .075

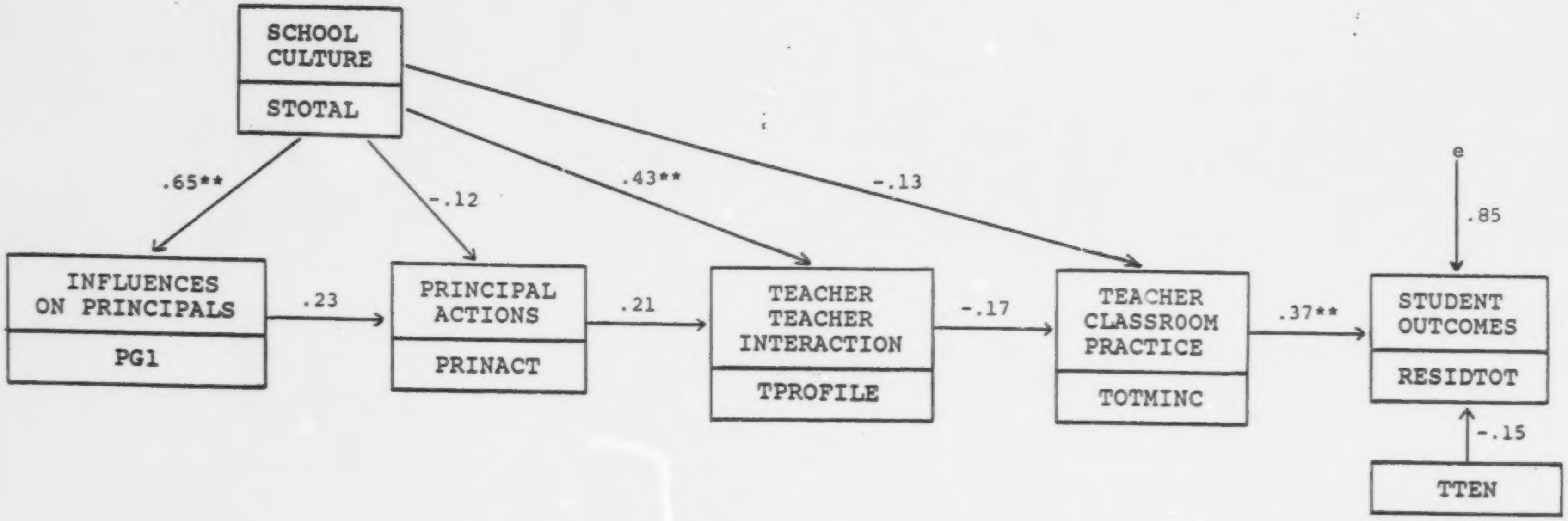
Note: ** $p<.05$
* approaching significance

EFFECTS ON GROWTH
IN STUDENT PERFORMANCE

| | Direct | Indirect | Total |
|---|---|---|---|
| TTE | -.15 | - | -.15 |
| TOTMINC | .37 ** | - | .37** |
| TPROFILE | - | -.06 | -.06 |
| PRINACT | - | -.01 | -.00 |
| PGOALS | - | -.03 | -.03 |
| STOTAL | - | -.08 | -.08 |

Figure 4c

Path model of influence on growth in student performance
(TPROFILE substituted for TCOLLAB)
(Aggragated to class level, N=31, Maximum Likelihood Estimates)


SCHOOL CULTURE
STOTAL
.65**
-.12
.43**
-.13
INFLUENCES ON PRINCIPALS
PG1
.23
PRINCIPAL ACTIONS
PRINACT
.21
TEACHER TEACHER INTERACTION
TPROFILE
-.17
TEACHER CLASSROOM PRACTICE
TOTMINC
.37**
STUDENT OUTCOMES
RESIDTOT
e
.85
-.15
TTEN

---

GOODNESS OF FIT

$X^2$ = 7.74 N.S. √√
GFI = .934
AGFI = .831
RMSR = .075

Note: ** p<.05
* approaching significance

EFFECTS ON GROWTH
IN STUDENT PERFORMANCE

| | Direct | Indirect | Total |
|---|---|---|---|
| TTE | -.15 | - | -.15 |
| TOTMINC | .37** | - | .37** |
| TPROFILE | - | -.06 | -.06 |
| PRINACT | - | -.01 | -.01 |
| PG1 | - | -.003 | -.003 |
| STOTAL | - | -.08 | -.08 |

Figure 4d

Path model of influence on growth in student performance
(PG1 & TPROFILE substituted for PGOALS & TCOLLAB)
(Aggragated to class level, N=31, Maximum Likelihood Estimates)

## 4.3 PRINCIPALS' TREATMENT

### 4.3.1 Action Plans

Four of the five principals submitting formal action plans chose to follow the recommended plan outline (see Appendix B-6); the fifth principal submitted a plan outlining objectives and strategies to be implemented in achieving the objectives. Three of the principals addressed all five of the dimensions in the teacher-teacher interaction profile while one decided to focus on the "planning" and "delivery" dimensions only. Several of the plans for specific dimensions indicated that principals had hoped to move staff up more than one level on the profile.

A debriefing meeting was held in April to discuss the level of success principals had had in implementing their plans. For the most part, success was limited although principals reported that they had made progress on some dimensions. The exercise appeared to be a learning experience for principals concerning their own perceptions within the school. Some indicated that having made physical and support arrangements concerning joint activities, teachers did not progress well due to emerging personal conflict or any number of other obstacles. Limited time, lack of commitment, continued focus on content instruction, and entrenched values were some of the obstacles listed. According to one principal, the more people that were involved, the more likely unforeseen obstacles would arise.

There seemed to be a general consensus that "planning" activities were most suitable for collaborative efforts. Some concern was expressed about resources available for such activity or whether the constraints of a small school would foster such collaboration. But as one principal put it "If they plan together they will work together."

### 4.3.2 Treatment Effects

Tests for differences attributable to treatment group (Knowledge Use, Knowledge Only) were conducted using the Kruskal-Wallis Oneway Analysis of Variance procedure. The decision to use this non-parametric test was based on the limited number of cases available for analyses (12). All variables from the set used to test path models in the main study and upon which principals were anticipated to have influence served as dependent variables for the present analyses. The tests for significance revealed that no statistically significant differences could be attributed to the principal treatments. Figure 5 shows boxplots (see Appendix D for explanation) of the distributions of the two scores for the groups. These displays show how groups compare in terms of their median scores, distributions and unusual responses.

In Figure 5 no difference between groups is observable for student outcome (Figure 5a) or classroom practice (Figure 5b) variables. On the other hand, very marginal differences may be observed for both measures of teacher-teacher interaction (Figures 5d & 5e) and for the measure of principal actions (Figure 5f). All of these differences are in the expected direction: in schools where principals participated in the Knowledge Use treatment, slightly more effort to promote collaboration on behalf of principals and slightly more collaboration on behalf of staff was observable. These results are somewhat promising and it is possible that the small number of cases in each of the treatment groups precluded statistical support for them. Differences due to treatment for variables representing influences on principals (Figures 5g & 5h) and school culture (Figure 5i) were not apparent.

```
            ---------------------------------------------------
Knowledge  (I                        +                        I)--
   Use      ---------------------------------------------------

                                      --------------
Knowledge      *                (     I         +  I)----
   Only                               --------------
          +---------+---------+---------+---------+---------+---------+--RESIDTOT
       -3.0      -2.0      -1.0       0.0       1.0       2.0
```

Figure 5a
Box and Whiskers Display of Student Score
by Principal Treatment Group

```
                       -----------
Knowledge  -----(------I        +I                    )           O
   Use                 -----------

                       --------
Knowledge          --(-I      +             )      *
   Only                 --------
          +---------+---------+---------+---------+---------+---------+--TOTMINC

       21.0      28.0      35.0      42.0      49.0      56.0
```

Figure 5b
Box and Whiskers Display of Teacher Classroom
Practice (Total Minutes in Week 3)
by Principal Treatment Group

```
                                 ----------------
Knowledge     --------------(----I   +          I)--
   Use                           ----------------

                                   ---------------------------------
Knowledge         -------------(---I  +                           )
   Only                            ---------------------------------
          --------+---------+---------+---------+---------+----TTE
               2.70      3.00      3.30      3.60      3.90
```

Figure 5c
Box and Whiskers Display of Teaching Efficacy
by Principal Treatment Group

```
                        ------------------
Knowledge             -(I       +       I----)---------------
   Use                  ------------------

             ------------------------------------------
Knowledge    (      +                                 I-)------
   Only      ------------------------------------------
          ------+---------+---------+---------+---------+------TCOLLAB
             1.05      1.20      1.35      1.50      1.65      1.80
```

Figure 5d
Box and Whiskers Display of Teacher_Teacher
Interaction (Number of Collaborators)
by Principal Treatment Group

```
                                     --------------------
Knowledge                        ---(I             +    I)--
   Use                               --------------------

             --------------------------------------------------
Knowledge   -(           +                                    I)-
   Only      --------------------------------------------------
          ------+---------+---------+---------+---------+------TPROFILE
            0.240     0.320     0.400     0.480     0.560     0.640
```

Figure 5e
Box and Whiskers Display of Teacher-Teacher
Interaction (Profile Score)
by Principal Treatment Group

```
                         -------------------------
Knowledge                (                       +--)----------
   Use                   -------------------------

                         --------------
Knowledge    ----(-------+            )
   Only                  --------------
          +---------+---------+---------+---------+---------+--PRINACT
       0.80      1.60      2.40      3.20      4.00      4.80
```

Figure 5f
Box and Whiskers Display of Principals' Actions
by Principal Treatment Group

```
                                                 -------
Knowledge                          *         (   I   + I)----
   Use                                           -------

                     -------------------------------------
Knowledge    ------(-I                              +    I-)------
   Only              -------------------------------------
          --+---------+---------+---------+---------+---------+PGOALS
         3.85      4.20      4.55      4.90      5.25      5.60
```

Figure 5g
Box and Whiskers Display of Influences on Principals
(PPBI Goals Dimension)
by Principal Treatment Group

```
                                                  --------
Knowledge                                   ----(-I   +  I-)-----
   Use                                            --------

                      ------------------------------------------
Knowledge    -------(-I                              +         I)--
   Only               ------------------------------------------
          ----+---------+---------+---------+---------+--------PG
           3.85      4.20      4.55      4.90      5.25      5.60
```

Figure 5h
Box and Whiskers Display of Influences on Principals
(PPBI Source of Goals Sub-dimension)
by Principal Treatment Group

```
                              -------------------------
Knowledge       ----------(---I              +        I-)----
   Use                        -------------------------

                              ---------------------------
Knowledge                 ---(I           +             I-)------
   Only                       ---------------------------
          --------+---------+---------+---------+---------+----STOTAL
               4.20      4.40      4.60      4.80      5.00
```

Figure 5i
Box and Whiskers Display of School Culture
(Total School Characteristics Score)
by Principal Treatment Group

# 5. DISCUSSION AND CONCLUSIONS

## 5.1 METHODOLOGICAL CONSIDERTIONS

Large quantities of data were collected from a relatively small sample of schools and classes. Given the nature of schools and schooling, studies of this nature are generally very challenging from a data collection, management and processing point of view. The present study is no exception. Hence, methodological considerations may play an important role in interpreting the findings. These considerations fall into two main categories: technical and conceptual. Each category will be addressed in order.

### 5.1.1 Technical Considerations

First, from a statistical point of view, the small sample size was very problematic. There was sufficient variation on key variables over classes to warrant using class as the unit of analyses for the main correlational analyses. This meant that analyses were based on a maximum of 88 classes. A sample size of 88 is generally not restrictive for statistical purposes. A rule of thumb for causal modelling is to obtain a ratio of cases to variables of 10:1. In practice, studies reporting causal models have been known to violate this assumption, sometimes rather dramatically (e.g., Heck, Marcoulides & Glasman, 1989; Leithwood, Lawton & Cousins, 1989). If pairwise deletion of missing data had been employed, a sample size of 88 would be sufficiently large given the number of variables in our model. But in causal modelling it is important to use listwise deletion of missing data especially when large amounts of incomplete data are apparent. Listwise deletion protects against errors of singularity in the data (McDonald, 1985).

Appendix C is testimony to the fact that the present data base was fraught with missing cases. The principal investigators necessarily engaged in repeated and sustained efforts to encourage teachers to comply with data collection requirements. In general, these efforts met with success but the achievement of complete data sets at the level of the classroom was uneven. As a consequence, path analyses were conducted on sample sizes that were substantially reduced. This practice carried with it restrictions of various sorts but two are of significant interest: restrictions on exploratory modeling; and restrictions on sensitivity to effects.

In causal modelling it is well known that researchers should determine models a priori and that subsequent alteration, or refinement should be done only on the basis of substantive considerations, prior theory, and the like (Joreskog & Sorbom, 1981; McDonald, 1985). Cousins (1988) employed a technique that permits exploration and efforts to improve the fit of the model. The data are divided into statistically independent sub-samples. All (substantively motivated) changes and improvements on the original model are made with one sub-sample and when complete, crossvalidated with the other. At that point the researcher has confidence in dismissing claims that model refinement was merely a process of capitalizing on *errors of measurement*. Due to small sample size, the use of this technique was not possible in the present study. However, it should be noted that the path models reported did fit the data suggesting that any improvements to the model would be small. Nonetheless, non-recursive models were unable to be tested, although from a conceptual standpoint it would make sense to do so; it is entirely likely, for example, that principals influence school culture in addition to being influenced by it.

With small sample sizes, sensitivity to effects becomes problematic and the Type II error rate (lack of statistical significance when, in fact, an effect was present) is inflated. To compensate for this in the present study, criteria for judging statistical significance of path coefficients and group differences were relaxed somewhat. As a consequence, limitations are placed on the confidence one puts into interpreting the findings.

Another technical issue concerns the reliability of variables in the models. For the most part, levels of internal consistency were more than adequate, often exceeding .80 (see Table 8). In the case of principals' actions, however, reliability was observed to be problematic. Normally, when confronted with such findings efforts to improve reliability might take the form of either redefining or substituting for the variable in question. The data, however, were very limited with regard to this particular component of framework (as is discussed below) and as such, did not permit such action.

### 5.1.2 Conceptual Considerations

Primary conceptual issues that need to be addressed concern the construct validity of the variables in our model. From a theoretical standpoint, the conceptual framework underlying the research is well justified, logical and appropriate, but the researchers' ability to validly measure key variables was uneven. For example, the measure of student outcomes was an unquestionably valid indication of growth in student performance in decision making. There was neither the need nor the inclination to measure this construct in different ways (although it might be noted that principals and teachers were asked during site visits about their perceptions of student outcomes). For most other variables in the framework, choices were not so clear. Many of the components are very complex phenomena that, realistically, are unable to be measured by any single indicator. For that reason, multiple measures of various constructs were analyzed. Ideally, multiple indicators of given constructs would be entered into a structural equation model; the constructs would then be represented by *latent variables* defined by multiple indicators (Joreskog & Sorbom, 1981). For technical reasons reported above, such an approach was not feasible with the present data.

As a consequence, the researchers necessarily embarked on a search for the "best" indicator of a given construct. The decision rules employed placed a premium on relationships among variables and availability of complete data, in addition to their individual conceptual underpinnings. Such a strategy was not without costs from a conceptual point of view. For example, it is becoming increasingly more apparent that the phenomenon of teacher collaboration is extremely complex and multidimensional (Campbell & Southworth, 1990; Hargreaves & Wignall, 1989; Leiberman, 1988; Leithwood & Jantzi, 1990; Little, 1982; 1986; Rosenholtz, 1986; 1989). But only two variables were retained for the present analyses. While one is manifestly unidimensional (number of colleagues collaborating), the other accounts for five dimensions of the teaching learning process (objective setting, collaboration in planning, delivery, student evaluation and feedback from colleagues). Arguably, these variables are valid measures of collaboration. But do they sufficiently capture the entire essence of what is meant by collaboration? A similar problem concerns the measure of school culture. To be sure, the measure captures multiple dimensions associated with one's perception of the values shared among colleagues in the school, but questions remain about the extent to which this is done validly. Hargreaves (1990), for example, talks about the "form" as well as "content" of school culture.

Measuring teacher actions in the classroom proved to be very difficult in the present study. Due to limited resources, we were unable to observe their actions in the classroom and as such were left with their "self-report" activity data. Such data are often biased toward perceived socially desirable responses and warrant corroboration from independent measures. None were available in this study.

Finally, given the uneven nature of complete data and the use of listwise deletion of cases as described above, a concern that surfaces has to do with sample bias. In what significant ways did those that provided complete data differ from those that did not? Similarly, did principals that continued in the principal treatment through to its completion differ significantly from those who decided to withdraw? These are questions for which answers are not readily available. During our site visits, suspicions about competing priorities, overloaded work schedules, and in some cases, lack of motivation to participate in the project were corroborated.

The reader must be cognizant of these methodological considerations in reviewing and interpreting the findings. To be sure, the results of the present study are both exploratory and tentative but they provide, the authors believe, some useful insights into the research questions posed. In retrospect, the methodology of the study comes into question given the concerns listed above. Unquestionably, a "soft-nosed logical positivist" qualitative paradigm (Miles & Huberman, 1984) would have been more sensitive to the subtle nuances of many of the complex phonomena studied. But the appropriateness of such an approach to testing the framework would remain dubious. It is the authors' contention that the present methodology, with concerted effort to overcome the limitations listed above (primarily by substantially increasing the sample size), is the most suitable approach to answering the questions posed. We now turn to a discussion of findings and how they might be interpreted.

## 5.2 PRINCIPALS' INFLUENCE ON COLLABORATION

Statistical path models revealed that principals' influence on collaboration among staff was highly limited. There was no connection between principals' actions and the number of people involved in collegial activities, but modest influence of principals on collaboration defined by profile scores. The comparison of "knowledge use" to "knowledge only" principals also revealed some interesting tendencies in this regard. It would appear that some positive impact was attributable to the principal intervention to the extent that knowledge use principals did engage in actions directed at fostering collaboration, and that these actions had modest and positive effects on collaboration as measured by profile scores and, to a lesser extent, number of people collaborating.

To a very weak extent, these findings corroborate observations made by many researchers that principals can play a key role in fostering collaboration among staff (Fullan, 1982, 1986; Leiberman, 1988; Leithwood & Jantzi, 1990; Leithwood & Montgomery, 1986; Little, 1982; 1986; Rosenholtz, 1986; 1989). This relatively weak link between actions that principals take and teachers' collaboration on specific innovation implementation may be explained in part by the concept of principals' motives. Aside from those in the knowledge use group, principals may not have been motivated to foster teacher-teacher interaction for any one or all of a variety of reasons.

First, they may have had some concerns about the validity of the claim that teacher-teacher interaction can be a powerful determinant of teachers' classroom practice and, ultimately, student outcomes. As discussed below in greater detail, Hargreaves (1990; see also Hargreaves & Wignall, 1989) makes some compelling arguments for the legitimacy of individualism within the school. In particular, he suggests that individualism may be an adaptive strategy that teachers use due to structural constraints, their desire to do the best and most efficient possible job given their work environment, the "care" they have for their students, and finally, their own sense of individuality and need for solitude. Principals in the present study were once teachers themselves (some were still teaching part-time) and may have empathized with such justifications for the maintenance of individualism.

A second reason principals may not have seriously stimulated teachers to collaborate in teaching thinking skills may have concerned their leadership style. Leithwood et al., (in press) have identified several studies that focus on the nature and consequences of varying principal leadership styles. As pointed out by Leiberman, Saxl and Miles (1988), leadership in initiating collaboration requires some rather unique personal qualities and traits. Leaders must be able to engage effectively in conflict resolution strategies and must have acquired confrontational skills. Presumably, these skills overlap somewhat with specific leadership styles such as "systematic problem solver" (Leithwood & Montgomery, 1986), "initiator" (Hall, Rutherford, Hord & Hulings, 1984) and "open" principals (Blase, 1989). Our model accounted for leadership style viz à viz the "influences on principals" component by controlling for the effects of principals' use of goals. The goals dimension is but one of several that derive from Leithwood & Montgomery's Principal Profile (1986). Perhaps, further investigation of the impact of leadership style on principals' actions and even directly on teacher-teacher interaction would provide some more conclusive evidence about the effects of this construct.

As an important question to ask concerning principals' motives, one might consider whether the teaching thinking skills is consistent with the shared goals of the school. Several writers have identified as an integral component of instructional leadership the principals' involvement in developing among staff a mission for the school or a set of shared goals (e.g., Bamburg & Andrews, 1989; Hallinger & Murphy, 1985; Hallinger, 1989; Leithwood & Montgomery, 1986; Leithwood et al., in press; Smith & Andrews, 1989). If, in fact, principals are disposed to developing such a set of goals in their school the question of the congruence of thinking skills with the set is important. In practice, there may have been several competing initiatives underway in the school that by virtue of their overlap with the school mission would be considered to be a higher priority. Such initiatives would likely receive greater degrees of the principals' direct and indirect support. Indeed, data from our site visits bear out this hypothesis to a reasonable extent. An additional point to be made concerns the wide variety of activities occurring in the schools. Regardless, of whether competing interests overlap with school mission, it is likely that the mere existance of a wide variety of interests and implementation tasks (which was characteristic of the board as discussed below) would serve to diminish the principals' emphasis on teaching thinking skills in at least some schools. More is said about this type of influence below under a discussion of the effects of school culture.

As a final reason as to why principals may not have been motivated to foster collaboration, they were not held accountable for doing so. The district was one that might be characterized as "loosely coupled" to the extent that principals operated with considerable autonomy from centralized influence. It seems likely that a non-system initiative such as the thinking skills project would be even further removed from the realm of accountability for principals. Perhaps it would be prudent to expand the conceptual framework to account for variability explained by central office influence.

A good deal of consideration has been given here to the concept of principals' motives. A related concern has to do with the dynamics of the relationship between staff and the principal. Again, this touches on the image of effective instructional leadership to the extent that more effective leaders are able to break down traditional administrator-teacher barriers and to engage in actual collegial relationships with staff themselves (Barth, 1989; Blase, 1989; Miller, 1988). Some authors argue for restructuring control in such a way as to foster more collaborative decision processes. For example,

> ...if we want to change the culture of teaching as a basis for more open and rigorous curriculum planning we might do well to start with structures that support it. (Hargreaves, 1989, p. 53)
>
> ...[school system] administrators must be willing to relinquish their control and share it with teachers. (Miller, 1988, p. 183)

Central to this argument are the concepts of *teacher empowerment* (Fullan, 1988, Hunt, 1987; Sergiovanni, 1987) and *trust* between principal and staff (Tarter, Bliss & Hoy, 1989). However, Tarter et al. question principals' ability to initiate collaboration among staff. They argue that teachers being engaged in their work is a precondition for collaboration but that it is the teachers themselves that must initiate collaboration. In other words, a principal can lead teachers to collaborative water but might be hard pressed to make them drink. Nonetheless, it seems likely that the dynamics of the relationship between principal and teacher is an important construct to consider and one that is not adequately accommodated by the present framework.

## 5.3 CONSEQUENCES OF PRINCIPALS' ACTIONS

The data show little, if any, impact of principals' actions on teacher practices in the classroom and student learning outcomes. On the one hand, there is a growing body of literature that suggests that principals can and do have significant influence at the level of classroom implementation and student growth (e.g., Andrews et al., 1986; High & Achilles, 1986). On the other, there are several good reasons why we might expect this not to be the case in the present study.

First, the implementation literature has repeatedly indicated that implementation takes time (Fullan, 1982; Fullan & Pomfret, 1977; Huberman & Miles, 1982; Ingvarson & McKenzie, 1988; Leithwood et al., 1986). It seems very likely that the relatively short time frame of the current project was inadequate in allowing for the influence of principals to become manifest. It is true that the project had begun in the previous year with grade 4 teachers as the focus but during that year principals were not directly involved. It was not until the current year's in-service sessions that principals had any other defined role than freeing up teachers to attend central workshops. Their role became one of at least "symbolic support" for the project by attending the central workshops with teachers and librarians. While this strategy is may be beneficial for implementation (Fullan, 1986; Little, 1982; 1986; Ingvarson & McKenzie, 1988) the short time frame factor was likely potent for the reason that the teachers (and principals) were just being introduced to the innovation and as such had not yet internalized the central concepts and skills to any great extent.

Second, symbolic support can work against a principal if he/she does not appear to have a complete working knowledge or understanding of the innovation (Fullan, 1981; Louis & Dentler, 1988). This seems likely to be the case in the present data in that principals were not required to engage in a direct way in the actual implementation.

Third, many of the arguments that apply to the lack of observed principals' influence on collaboration also apply to the question of implementation. Was there goal consensus in the school? Was the innovation consistent with the shared goals of the school? Again, this factor is not adequately accommodated by the conceptual framework.

A fourth reason that may partially explain principals' lack of impact on classroom instruction and student growth in decision making concerns not only goal consensus, but also the nature of the goals of the innovation. Leithwood and Jantzi (1990) in a recent study demonstrated some rather impressive (and atypical) norms of collaboration in a purposive sample of schools all having successful school improvement projects. Through actions of support and pressure principals had a significant contribution in promoting collaboration and the success of the school improvement effort. These projects, unlike the present one, were well established over several years in some cases. But more importantly, staff were found have a high level of commitment to the innovation. As the authors point out,

> ...it is unlikely that people will be motivated to pursue [restructuring schools], as an end in itself.... Our case studies suggested that most people were motivated to change by goals much more concerned with curriculum and instruction. (p. 19)

While it is true that teaching thinking skills might be an "educationally compelling" innovation to at least some teachers, without sustained pressure (e.g., encouraging teachers not commited to the school goals to transfer) and support (e.g., delegation of decision-making responsibility to school improvement team) from principals, nor a significant overlap with the shared goals of the school, it seems likely that the connection between principals' actions and subsequent impacts at the classroom level would be weak.

Finally, as was noted in the literature review, not all data concerning principals' impact on student outcomes is uniform. Zirkel and Greenwood (1987) discussed very compelling concerns about the nature of research on principal effectiveness. They raised some very serious questions about nature of principals' impact on students. In addition, other studies have shown effects of principals on implementation and student outcomes that are either contrary to expectations (e.g., Leithwood et al., 1989) or not detectable (e.g., National Diffusion Network study, cited by Crandall, 1989).

## 5.4 TEACHER COLLABORATION AND SCHOOL CULTURE

The present findings show that influences on principals and the extent to which teachers collaborated were both significantly dependent upon values shared in the school or school culture. Neither of these findings is particularly surprising. What was found to be surprising was the fact that school culture predicted negatively (although very weakly) principal actions in fostering collaboration and teacher classroom practice, and a similar pattern was found to describe the relationship between teacher-teacher interaction and what teachers did in the classroom. Such unexpected results invite an explanation.

Some observations about the culture of the schools and the school system might be helpful in setting the stage. First, the board is located in a rapidly growing, and consequently, turbulent region. In some schools, as many as 21 portable classrooms were fully utilized. Second, staff mobility was high. Many teachers were retiring and there was a steady influx of new staff due to this and growth related factors. Third, principal mobility was equally high due in part to a system 5-year transfer policy and the annual opening of several new schools.

Fourth, relatively speaking, the board was large and consequently, wealthy. There were many, many exciting curriculum innovations happening and resources for staff development were abundant. Fifth, as mentioned above, the system was very much loosely coupled and as a consequence, somewhat of a "culture of volunteerism" was in evidence. With so many new initiatives, it was essentially up to individual teachers and principals to decide their level of participation in programs to which they were attracted. Teachers and principals in this system were, in the authors' view, relatively immune from scrutiny and accountability. Finally, data from site visits suggest that collaborative cultures were few and far between in the schools. The researchers were somewhat surprised that this appeared to be the case in view of the fact that a "partners in action" initiative which promotes collegial partnerships between teachers and teacher-librarians had been operating for some time.

Having made these comments (based on more than three years experience in implementing the thinking skills and other in-service) the following might be considered as a possible explanation for the unexpected findings reported above. First, a particular "form" of culture (pattern of relationship among individuals), one of individualism (Hargreaves, 1990) was the norm in the schools. Schools that were more inclined to share values and to have more positive school cultures were also likely to be more collaborative concerning the thinking skills project. But for the most part, schools did not manifest the shared values that are conducive to such teacher-teacher interaction. Second, it is well known among those familiar with the curriculum change and implementation literature that adoption is rarely followed by faithful implementation unless emphasis on in-service training, staff development and collegial support systems is present (e.g., Huberman & Miles, 1982; Crandall, 1983). Whereas, in-service was provided and followed in the present project by within school activity requirements, subtle pressure from the principal investigators to comply with data collection demands and implementation, and site visits in all schools, staff development and collegial support were suspect concerning teaching thinking skills. Therefore, it seems reasonable to assume that many of the teachers were not persuaded that thinking skills should be implemented.

Given this premise, one of two possibilities might account for the unexpected results. First, if non-implementation was the norm it might be expected that teachers that collaborated with one another (for whatever reason) would support the norm to a greater extent. Hence, the negative relationships reported above would be expected. Also, this argument might explain the similar finding regarding teaching efficacy and student achievement. Teachers with high efficacy belief might be those who are living up to the image in the school as "good teachers"--those who support the norms of the school including the norm of non-implementation of the thinking skills curriculum.

Second, according to some ethnographic researchers (e.g., Campbell & Southworth, 1990; Hargreaves, 1990), the jury is still out on our understanding of teacher-teacher interaction, collaboration and collegiality. They made the argument, as alluded to above, that sometimes individualism is appropriate, expected and legitimate. In his thorough and interesting analysis of the term in the context of his own data on teachers' use of preparation time, Hargreaves (1990) concluded that,

> Individualism and collegiality, it was discovered, were considerably more complex phenomena than we and many other writers had imagined. (p. 12)

According to Campbell & Southworth (1990),

> ...it seems unlikely that collegiality will be realised in every school. One wonders about the appropriateness of wholesale advocacy of a single style. Is there really only one way to run an effective school?

Teachers may prefer to work alone for a variety of reasons as noted by the aforementioned authors. They may find it more efficient, they do not wish to spend time away from their students, they may not wish to relinquish control over their students, they may be isolated physically (geographically), they may require and appreciate opportunities for solitude, and so on. In a system with many competing interests, heavy workloads, an abundance of portable classrooms, high mobility of staff and administration, and low accountability, it seems quite possible that teachers who were further advanced in implementing the thinking skills curriculum and whose students produced greater levels of performance in decision making were likely to be less inclined to collaborate with colleagues. But if school norms depreciated attention to thinking skills in favour of focusing on transmission outcomes teachers who defined themselves in these terms might have reduced beliefs in their ability to bring about student growth.

As further support for the argument, Leithwood & Jantzi (1990) note that there are certain costs of collaboration (time, effort); costs that will diminish once, as in the case of schools with successful school improvement projects, collaboration becomes the norm. This line of reasoning parallels the so called "implementation dip"--things seem not to work out as planned until folks get used to the change and until they acquire the requisite set of skills, knowledge and attitudes. Similarly, one's performance in driving a car or swinging a golf club can be severely hampered in the early going by what seem like an endless list of procedural skills upon which to concentrate. Once the novice develops the expertise, the task becomes second nature (albeit, more so for drivers than golfers). Could it be that an implementation dip occurred with newly attempted collaboration in an otherwise individualistic world?

## 5.5 SIGNIFICANCE AND IMPLICATIONS

Previous efforts to foster principal effectiveness in curriculum leadership have met with only limited success for reasons specified above. Findings from the present study have implications for such efforts from both theoretical and practical standpoints.

From a theoretical perspective, the present study inquired into two aspects of the principalship that have been identified as gaps in our knowledge (Leithwood et al., in press). The first aspect of interest was the focus on the influences of principals' internal mental processes and states on their actions. Principals in the Knowledge Use Group were given an opportunity to further develop their knowledge about the problem of fostering teacher-teacher communication and to develop strategies aimed at solving that problem. Although these principals met with only moderate success in their efforts to promote collaboration, the results provide us with further insights into influences guiding principals practices. Many quesions emerged concerning principals' motives and forces external and internal to the school that have some bearing upon them. Further research is required to address these issues more directly. In particular, our framework might be expanded to better acccomodate influences on principals derived from external sources.

A second area of interest for research concerns the furthering of our knowledge about the mediation of principals' influences on student outcomes by school and classroom factors--specifically, teacher-teacher interaction and teachers' instructional practices. Questions about sustained principals' influence (support and pressure) in developing collaborative norms come to the fore. As Fullan (1990) noted in a recently delivered invited address, research concerning collaborative cultures and their potential impact on schools and schooling is fairly well developed. We have noted that all research is not uniform in this regard and that concepts of individualism within schools should be given serious consideration. Of particular interest are the previously unreported negative relationships between teacher-teacher interaction and implementation, and a similar set of negative relationships involving teaching efficacy, teacher collaboration and student achievement. Nonetheless, recent research has demonstrated some very encouraging findings not only with respect to the effects of collaborative cultures but concerning the principal as a key figure in developing such cultures. Clearly, further research in this general domain is worthy of pursuit.

From a methodological standpoint, studies employing the present design may be limited rather significantly by low numbers of cases. The phenomena studied are sufficiently complex as to require large bodies of data in order to provide valid respresentations of the processes of interest. Given the nature of life in schools the extent to which such research will be possible is likely to be limited. As an alternative, a "soft-nosed positivistic" approach (Miles & Huberman, 1984) might prove useful in unpacking the complexities observed and in furthering our knowledege and understanding and the adequacy of the framework. Such a research tack seems most appropriate for inquiry in this domain.

Finally, the present study has implications from a practical perspective. As an important product the development by principals of the profile of growth in teacher-teacher interaction may be an important tool that can be adapted to many varied school contexts. The tool appears to be useful for principals in developing school plans and identifying obstacles that might interfere with the implementation of those plans. For many principals the term curriculum leadership has become a popular label for a somewhat vague and misunderstood concept. Tools such as the profile provide principals with a "hands-on" mechanism to move more directly into a curriculum leadership role.

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# APPENDICIES

Appendix A: Instruments and Response Patterns

- A-1 Student Achievement Tests
- A-2 Teacher Style Survey
- A-3 Principal Style Survey
- A-4 Principal Interview Guide
- A-5 Teacher/Librarian Interview Guide
- A-6 Teacher Activity Record
- A-7 Teacher Librarian Activity Record
- A-8 School Characteristics Survey

Appendix B: Materials

- B-1 Resource Package for Teaching Decision Making
- B-2 Directions for Data Collection and Record Forms
- B-3 Correspondence and Follow-up Reminders
- B-4 Procedure for Site Visits
- B-5 Principal Treatment Correspondence
- B-6 Principal Treatment Materials

Appendix C: Data Procedures and Codes

- C-1 Directions for Markers (Student Data)
- C-2 Interview Codes

Appendix D: Box and Whiskers Display Key

***APPENDIX A-1a***

## THE [redacted] BOARD OF EDUCATION

## DECISION MAKING TEST A

1. Your Name________________________________________

2. Are You a Boy or a Girl?______________________________

3. Your Age $\overline{X} = 10.11$ SD = .43

4. Your Birthday______________________________________
(month) (day)

5. Your Grade________________________________________

6. Your Teacher's Name__________________________________

7. Your School_______________________________________

8. Suppose your school was given some money for new playground equipment. How should the school decide what kind of equipment to buy?

| N | PRETEST | POSTTEST |
|---|---|---|
| TOTAL | 790 | 1510 |
| FORM A | 904 | 733 |
| FORM B | 885 | 777 |

| | $\overline{X}$ | SD | $\overline{X}$ | SD |
|---|---|---|---|---|
| Alternatives | .23 | .42 | .73 | .44 |
| Criteria | .86 | .78 | 2.93 | 1.83 |
| Summary | .03 | .16 | .49 | .50 |
| Total | 1.12 | 1.27 | 4.10 | 2.55 |

## THE [redacted] BOARD OF EDUCATION

## DECISION MAKING TEST B

1. Your Name________________________________________

2. Are You a Boy or a Girl?________________________________

3. Your Age________________________________________

4. Your Birthday______________________________________
   (month) (day)

5. Your Grade________________________________________

6. Your Teacher's Name__________________________________

7. Your School_______________________________________

8. Suppose a grade 5 class was put in charge of a television station.
   How should the class decide which program to show on Fridays at 7:00 p.m.?

***APPENDIX A-3***

# PRINCIPAL STYLE SURVEY

PRINCIPALS*

Name:____________________ School:____________________ Role ☐ Teacher ☐ Teacher-Librarian

## Instructions

Based on your knowledge of the principal/vice principal indicate how likely he or she is to exhibit each of the following behaviors. Do so by circling the appropriate number. Circle one number only or 'N.A.' where items are either not applicable or where you have insufficient knowledge upon which to base your ratings. Try to use the 'N.A.' response as infrequently as possible.

---

## 1. Goals

### 1.1 Source of Goals

*How likely is it [1=Not Likely; 6=Extremely Likely] that the principal/vice principal would:*

1. establish goals for the school which reflect Ministry policy?

1 2 3 4 5 [✓ 6] N.A.

2. establish goals for the school which reflect school system priorities?

1 2 3 4 5 [✓ 6] N.A.

3. establish goals for the school which reflect community and student needs (including data on student achievement)?

1 2 3 4 [✓ 5] 6 N.A.

4. involve staff in setting school goals?

1 2 3 4 [✓ 5] 6 N.A.

5. work toward a set of goals which accommodate as many legitimate interests as possible?

1 2 3 4 [✓ 5] 6 N.A.

---

* Principals completed a form with instructions and item wording specific to self ratings.

### 1.2 Nature of Goals

*How likely is it [1=Not Likely; 6=Extremely Likely] that the principal/vice principal would:*

6. maintain goals that support an image of the learner as a self-directed problem solver?

1 2 3 4 [✓ 5] 6 N.A.

7. have as a goal the provision of the best education and best experiences possible for students?

1 2 3 4 5 [✓ 6] N.A.

8. include goals that recognize the importance of student development in knowledge and skill as well as affect?

1 2 3 4 5 [✓ 6] N.A.

9. translate educational goals into concrete objectives when needed?

1 2 3 4 [✓ 5] 6 N.A.

### 1.3 Use of Goals

*How likely is it [1=Not Likely; 6=Extremely Likely] that the principal/vice principal would:*

10. communicate the school goals to the school staff?

1 2 3 4 5 [✓ 6] N.A.

11. discuss the school goals with teachers at staff meetings?

1 2 3 4 5 [✓ 6] N.A.

12. refer to the school goals when making curricular decisions with teachers?

1 2 3 4 [✓ 5] 6 N.A.

13. refer to the school goals in student assemblies and in meetings with those outside the school?

1 2 3 4 [✓ 5] 6 N.A.

## 2. Strategies

### 2.1 Staff Supervision

*How likely is it [1=Not Likely; 6=Extremely Likely] that the principal/vice principal would:*

14. conduct formal observations in the classrooms on a regular basis?

1 2 3 [✓ 4] 5 6 N.A.

15. conduct informal observations in classrooms on a regular basis (informal observations are unscheduled, last at least 5 minutes, and may involve written feedback)?

1 2 3 [✓ 4] 5 6 N.A.

16. ensure that the classroom objectives of teachers are consistent with the stated goals of the school?

1 2 3 4 [✓ 5] 6 N.A.

17. review student work when evaluating classroom instruction?

1 2 3 4 [✓ 5] 6 N.A.

18. include objectives directly related to those of the school when evaluating teachers?

1 2 3 4 [✓ 5] 6 N.A.

19. point out specific strengths in teacher instructional practices in post-observation conferences?

1 2 3 4 5 [✓ 6] N.A.

20. point out specific weaknesses in teacher instructional practices in post-observation conferences?

1 2 3 4 5 [✓ 6] N.A.

21. note specific strengths of the teacher's instructional practices in written evaluations?

1 2 3 4 5 [✓ 6] N.A.

22. note specific weaknesses of the teacher's instructional practices in written evaluations?

1 2 3 4 5 [✓ 6] N.A.

23. note specific instructional practices related to the stated classroom objectives in written evaluations?

1 2 3 4 5 [✓ 6] N.A.

### 2.2 Program Planning

*How likely is it [1=Not Likely; 6=Extremely Likely] that the principal/vice principal would:*

24. make clear who is responsible for coordinating the curriculum across grade levels (e.g., the principal, vice principal, or teacher)?

1 2 3 4 [✓ 5] 6 N.A.

25. ensure that the school goals are translated into common curricular objectives?

1 2 3 4 [✓ 5] 6 N.A.

26. ensure that the objectives of special programs are coordinated with those of the regular classrooms?

1 2 3 4 [✓ 5] 6 N.A.

27. monitor the classroom curriculum to see that it covers the school curricular objectives?

1 2 3 4 [✓ 5] 6 N.A.

28. visit classrooms to see that instructional time is used for learning and practicing new skills and concepts?

1 2 3 4 [✓ 5] 6 N.A.

### 2.3 Direct Relations with Students

*How likely is it [1=Not Likely; 6=Extremely Likely] that the principal/vice principal would:*

29. take time to talk with students during recess and breaks?

1 2 3 4 [✓ 5] 6 N.A.

30. attend or participate in cocurricular or extracurricular activities?

1 2 3 4 [✓ 5] 6 N.A.

31. consistently model for students behaviors valued by the school?

1 2 3 4 5 [✓ 6] N.A.

32. provide opportunities for students to express their views on how well the school meets their needs?

1 2 3 [✓ 4] 5 6 N.A.

33. use student discipline situations to foster student growth?

1 2 3 4 [✓ 5] 6 N.A.

**2.4 Providing Staff with Knowledge and Skill**

*How likely is it [1=Not Likely; 6=Extremely Likely] that the principal/vice principal would:*

34. inform teachers of opportunities for professional development?

1 2 3 4 5 [✓ 6] N.A.

35. select in-service activities that are consistent with the school goals?

1 2 3 4 5 [✓ 6] N.A.

36. support teacher's requests for in-service that are directly related to the school goals?

1 2 3 4 5 [✓ 6] N.A.

37. actively support the use in the classroom of skills acquired during in-service training?

1 2 3 4 [✓ 5] 6 N.A.

38. provide time to meet individually with teachers to discuss instructional issues?

1 2 3 4 [✓ 5] 6 N.A.

39. set aside time at faculty meetings for teachers to share ideas on instruction or information from in-service activities?

1 2 3 4 [✓ 5] 6 N.A.

40. develop among staff a team approach to problem solving?

1 2 3 4 [✓ 5] 6 N.A.

### 2.5 Providing Incentives for Learning

*How likely is it [1=Not Likely; 6=Extremely Likely] that the principal/vice principal would:*

41. recognize students who do superior academic work with formal rewards such as an honor roll or mention in the principal's newsletter?

1 2 3 4 5 [✓ 6] N.A.

42. recognize outstanding individual effort by students?

1 2 3 4 5 [✓ 6] N.A.

43. ensure that parents are contacted to communicate improved student performances in school?

1 2 3 4 [✓ 5] 6 N.A.

## 3. Factors

### 3.1 Factors of Most Concern

*How likely is it [1=Not Likely; 6=Extremely Likely] that the principal/vice principal would:*

44. promote the appropriate assignment of students to teachers?

1 2 3 4 [✓ 5] 6 N.A.

45. have some desirable impact on program objectives and emphasis?

1 2 3 4 [✓ 5] 6 N.A.

46. affect in a favorable way the instructional behaviors of teachers?

1 2 3 4 [✓ 5] 6 N.A.

47. influence, in positive ways, materials and resources in the classroom?

1 2 3 4 [✓ 5] 6 N.A.

48. have some positive impact on the assessment, recording and reporting procedures of teachers?

1 2 3 4 [✓ 5] 6 N.A.

49. affect teachers' time/classroom management in desirable ways?

1 2 3 4 [✓ 5] 6 N.A.

50. positively influence the content of the teacher's program?

1 2 3 4 [✓ 5] 6 N.A.

51. have some favorable impact on interpersonal relationships in the classroom?

1 2 3 [✓ 4] 5 6 N.A.

52. positively affect the physical environment of the classroom?

1 2 3 [✓ 4] 5 6 N.A.

53. influence favorably integration across subjects and grades?

1 2 3 4 [✓ 5] 6 N.A.

54. have some positive impact on human resources in the school?

1 2 3 4 [✓ 5] 6 N.A.

55. favorably affect relationships with community?

1 2 3 4 [✓ 5] 6 N.A.

56. influence in desirable ways extracurricular and intramural activities?

1 2 3 4 [✓ 5] 6 N.A.

57. have some positive impact on relationships with out-of-school staff?

1 2 3 4 [✓ 5] 6 N.A.

58. affect relationships among staff in desirable ways?

1 2 3 4 [✓ 5] 6 N.A.

59. influence, in desirable ways, student behavior while at school?

1 2 3 4 [✓ 5] 6 N.A.

60. have some favorable impact on relationships outside of the classroom between teachers and students?

1 2 3 4 [✓ 5] 6 N.A.

## 3.2 Nature and Source of Expectations

*How likely is it [1=Not Likely; 6=Extremely Likely] that the principal/vice principal would:*

61. have concrete, specific expectations regarding those factors that significantly affect student learning (e.g., factors listed in items 44-60)?

1 2 3 4 [✓ 5] 6 N.A.

62. base expectations on competent professional judgments?

1 2 3 4 [✓ 5] 6 N.A.

## 4. Decision Making

*How likely is it [1=Not Likely; 6=Extremely Likely] that the principal/vice principal would:*

63. be able to use a variety of forms and procedures for decision making?

1 2 3 4 [✓ 5] 6 N.A.

64. choose the focus for decision making and decision making procedures after a careful analysis of such things as the nature of tasks and the skills of others involved?

1 2 3 4 [✓ 5] 6 N.A.

65. involve staff in those decisions that affect them when appropriate and when their skill and/or willingness permits?

1 2 3 4 [✓ 5] 6 N.A.

66. base decisions on the best available information?

1 2 3 4 [✓ 5] 6 N.A.

67. consistently use professional goals as a basis for making decisions?

1 2 3 4 [✓ 5] 6 N.A.

68. have a well developed set of principles or values which are regularly used for decision making?

1 2 3 4 5 [✓ 6] N.A.

***APPENDIX A-2***

NAME________________________ SCHOOL________________________
*Please Print*

## TEACHER STYLE SURVEY

N = 121

*Please indicate the degree to which you agree or disagree (1 = Strongly Disagree, 6 = Strongly Agree) with each statement below by circling the appropriate numeral to the right of each statement.*

○ = Median Response

| | Strongly Disagree | | | | Strongly Agree | | |
|---|---|---|---|---|---|---|---|
| 1. When a student does better than usual, many times it is because I exerted a little extra effort. | 1 | 2 | 3 | [✓ 4] | 5 | 6 | P |
| 2. The hours in my class have little influence on students compared to the influence of their home environment. | 1 | 2 | 3 | [✓ 4] | 5 | 6 | T* |
| 3. The amount that a student can learn is primarily related to family background. | 1 | 2 | 3 | [✓ 4] | 5 | 6 | T* |
| 4. If students aren't disciplined at home, they aren't likely to accept any discipline. | 1 | 2 | 3 | [✓ 4] | 5 | 6 | T* |
| 5. When a student is having difficulty with an assignment, I am usually able to adjust it to his/her level. | 1 | 2 | 3 | 4 | [✓ 5] | 6 | P |
| 6. When a student gets a better grade than he/she usually gets, it is usually because I found better ways of teaching that student. | 1 | 2 | 3 | [✓ 4] | 5 | 6 | P |
| 7. When I really try, I can get through to most difficult students. | 1 | 2 | 3 | 4 | [✓ 5] | 6 | P |
| 8. A teacher is very limited in what he/she can achieve because a student's home environment is a large influence on his/her achievement. | 1 | 2 | 3 | [✓ 4] | 5 | 6 | T* |
| 9. When the grades of my students improve it is usually because I found more effective teaching approaches. | 1 | 2 | 3 | [✓ 4] | 5 | 6 | P |
| 10. If a student masters a new math concept quickly, this might be because I knew the necessary steps in teaching that concept. | 1 | 2 | 3 | [✓ 4] | 5 | 6 | P |
| 11. If parents would do more with their children, I could do more. | 1 | 2 | [✓ 3] | 4 | 5 | 6 | T* |
| 12. If a student did not remember information I gave in a previous lesson, I would know how to increase his/her retention in the next lesson. | 1 | 2 | 3 | [✓ 4] | 5 | 6 | P |
| 13. If a student in my class becomes disruptive and noisy, I feel assured that I know some techniques to redirect him/her quickly. | 1 | 2 | 3 | 4 | [✓ 5] | 6 | P |
| 14. The influence of a student's home experiences can be overcome by good teaching. | 1 | 2 | 3 | [✓ 4] | 5 | 6 | T |
| 15. If one of my students couldn't do a class assignment, I would be able to accurately assess whether the assignment was at the correct level of difficulty. | 1 | 2 | 3 | 4 | [✓ 5] | 6 | P |
| 16. Even a teacher with good teaching abilities may not reach many students. | 1 | 2 | [✓ 3] | 4 | 5 | 6 | T* |

Note: P - Personal teacher efficacy    T - Teaching efficacy    * - Scale inverted for analysis

Name: ________________

School: ________________

Date: ________________

## Interview Guide for Principals

Principals N = 35

### Introduction

Last year in the thinking skills project people told us to understand the student results we had to talk to school staff about what actually happened in the school. That is why we are visiting you today. Everything that you say to me will be kept STRICTLY CONFIDENTIAL.

I am going to be taking notes as we go along. I would also like to tape record the interview as a back-up -- sometimes I can't read my own handwriting. If it would make you uncomfortable to have the tape recorder on, just say so and I'll turn it off.

1. I am going to begin by asking you about the plans that your staff developed for teaching decision making from February to April. [show planning sheets to interviewee].

(a) First of all, how many of your staff were involved in the project?

$\bar{X} = 2.84$ N = 32
SD = 1.3

(b) Did the staff share their plans with you? At whose suggestion?

yes = 21 65.6% N = 32

(c) Did your staff make changes to these plans?

yes = 11 33.3% N = 33

(d) If changes were made, what do you think led them to make these changes?

(e) What problems did your staff encounter in teaching decision making?

Now I'd like to ask you about the extent to which your staff (including the teacher-librarian) worked together in teaching decision making.

2. Did your staff set the objectives for teaching decision making by themselves or did they do it together (or with you)?

If with others,
who was involved
and how?

| OBJECTIVE SETTING | N |
|---|---|
| joint decision by all teachers involved with grade 5 instruction to pursue same objectives | 3 |
| joint decision by two teachers to pursue same objectives | 10 |
| partial agreement with other teacher(s) on objectives | 4 |
| inform other teacher(s) of different objectives | 2 |
| individual objective setting and informing of teacher-librarian | 1 |
| individual objective setting | 10 |

N = 30

If alone, why?

time & space: (e.g., no place to meet)

motivation: (e.g., no encouragement for helping others)

knowledge & skill: (e.g., nobody in the school knows anything about teaching thinking skills)

other:

3. Did your staff plan decision making lessons by themselves, or did they do it together (or with you)?

If with others,
who was involved
and how?

| PLANNING | N |
|---|---|
| joint construction of plans by all teachers involved with grade 5 instruction | 4 |
| joint construction of plans by two teachers | 10 |
| division of labour | 2 |
| informal sharing of plans | 8 |
| individual planning | 7 |

N = 31

If alone, why? [Look for reasons that differ from those given for Q2]

4. Did your staff teach the decision making lessons by themselves or did they deliver the instruction together (or with you)?

If with others,
who was involved
and how?

If alone, why? [Look for reasons that differ from those given for Q2]

| DELIVERY | N |
|---|---|
| mobile teacher(s) and combined activity centres | 1 |
| mobile teacher(s) or combined activity centres | 6 |
| exchanging materials | — |
| individual delivery making use of outside resources | 6 |
| individual delivery | 14 |

N = 27

5. Did your staff evaluate how their lessons went by themselves or did they involve others (including you)? For example, did they observe each other and comment about performance?

If with others,
who was involved
and how?

If alone, why? [Look for reasons that differ from those given for Q2]

| FEEDBACK TO TEACHER | N |
|---|---|
| peer coaching (observation and feedback involving all teachers involved with grade 5 instruction) | — |
| peer coaching (observation and feedback involving two teachers) | — |
| formal discussion of observations | 3 |
| informal discussion of shared anecdotes | 11 |
| one-way observation and feedback | — |
| informal relating of shared anecdotes | 5 |
| no feedback | 10 |

N = 29

6. Did your staff evaluate student performance by themselves or did they do this together (or with you)?

If with others,
who was involved
and how?

If alone, why? [Look for reasons that differ from those given for Q2]

| STUDENT EVALUATION | N |
|---|---|
| team marking by teachers | 1 |
| agreement on marking scheme by teachers | 2 |
| sharing marking schemes with teachers | 3 |
| individual marking | 16 |

N= 22

7. How satisfied would you say that your staff are with student progress concerning the decision making lessons? Why/not?

| Very Satisfied | | | Very Dissatisfied | |
|---|---|---|---|---|
| 1 | [✓ 2] | 3 | 4 | |
| 17.4% | 65.2% | 17.4% | — | N= 23 |

8. How satisfied are you with the extent to which your staff (including teacher-librarian) work together? Why/not?

| Very Satisfied | | | Very Dissatisfied |
|---|---|---|---|
| [✓ 1] | 2 | 3 | 4 |
| 43.3% | 30.0% | 23.3% | 3.3% |

9. (a) How would you describe the socio-economic make-up of the students in your school?

| very high | | middle class | | very low |
|---|---|---|---|---|
| 1 | 2 | [✓ 3] | 4 | 5 |
| 3.0% | 21.2% | 45.5% | 27.3% | 3.0% |

(b) How variable is the range of socio-economic make-up of students in your school?

| everybody the same | | | everybody different |
|---|---|---|---|
| 1 | 2 | [✓ 3] | 4 |
| 18.2% | 27.3% | 39.4% | 15.2% |

10. Do you have any finial comments about your participation in the thinking skills project that you would like to share?

| | |
|---|---|
| negative comment | 3 |
| neutral | 5 |
| positive comment | 14 |
| excuse | 3 |
| | N= 25. |

***APPENDIX A-5-1***

**Name**______________________

**School**______________________

Note: Teacher and Teacher-Librarian
Responses Summarized Here.

Librarians N=30
Teachers N=84

## Interview Guide for Teacher-Librarians

Last year in the thinking skills project people told us that to understand the student results we had to talk to teachers about what actually happened in the classroom. That is why we are visiting you today. Everything that you say to me will be kept STRICTLY CONFIDENTIAL.

I am going to be taking notes as we go along. I would also like to tape record the interview as a back up--sometimes I can't read my own handwriting. If it would make you uncomfortable to have the tape recorder on, just say so and I'll turn it off.

1. I am going to begin by asking you about the plans that teachers in your school developed for teaching decision making in February to April. Do you know if teachers made changes in their plans?

2. If you think that changes were made, why were they made?

3. Are you aware of any problems that teachers encountered in teaching decision making?

**Now I'd like to ask you about some of the decisions you were made when teaching decision making.**

**4. Did teachers set the objectives for teaching decision making by themselves or were you involved in the decision?**

| Circle the Level | N |
|---|---|
| **joint decision by all teachers involved with grade 5 instruction to pursue same objectives** | 15 |
| **joint decision by two teachers to pursue same objectives** | 12 |
| **partial agreement with other teacher(s) on objectives** | 13 |
| **inform other teacher(s) of different objectives** | 4 |
| **individual objective setting and informing of teacher-librarian** | 8 |
| **individual objective setting** | 47 |

N= 99

If yes, how were you involved?

If you were not involved, why?

time & space: (e.g. no place to meet)

motivation: (e.g. lack of cooperation from other staff)

knowledge & skill: (e.g. nobody in the school knows anything about teaching thinking skills)

other:

**5. Were you involved in the planning of teachers' decision making lessons, or did they do this by themselves?**

**If yes, how were you involved?**

**If no, why? (e.g. for the same reasons as Q4)**

**were there new factors?**

| **Circle the Level** | N |
|---|---|
| **joint construction of plans by all teachers involved with grade 5 instruction** | 12 |
| **joint construction of plans by two teachers** | 19 |
| **division of labour** | 7 |
| **informal sharing of plans** | 25 |
| **individual planning** | 36 |

N = 99

6. **Were you involved in the delivery in the classroom of your decision making lessons, or did teachers do this themselves?**

**If yes, how were you involved?**

**If no, why? (e.g. for the same reasons as Q4)**

**were there new factors?**

| Circle the Level | N |
|---|---|
| mobile teacher(s) and combined activity centres | 2 |
| mobile teacher(s) or combined activity centres | 17 |
| exchanging materials | 20 |
| individual delivery making use of outside resources | 19 |
| individual delivery | 41 |

N=99

**7. Were you involved when in deciding how well the decision making lessons lessons went, or was this done by the teachers by themselves?**

**If yes, how were you involved?**

**If no, why? (e.g. for the same reasons as Q4)**

**were there new factors?**

| Circle the Level | N |
|---|---|
| peer coaching (observation and feedback involving all teachers involved with grade 5 instruction) | 0 |
| peer coaching (observation and feedback involving two teachers) | 1 |
| formal discussion of observations | 5 |
| informal discussion of shared anecdotes | 19 |
| one-way observation and feedback | 3 |
| informal relating of shared anecdotes | 35 |
| no feedback | 35 |

N = 98

8. Were you involved in the evaluation of students' progress in decision making, or was this done by the teachers alone?

If yes, how were you involved?

| Circle the Level | N |
|---|---|
| team marking by teachers | 2 |
| agreement on marking scheme by teachers | 6 |
| sharing marking schemes with teachers | 14 |
| individual marking | 67 |

N= 89

If no, why? (e.g. for the same reasons as Q4)

were there new factors?

X

9. How satisfied are you with the progress that students made in the thinking skills project?

| Very Satisfied |  |  | Very Dissatisfied |  |
|---|---|---|---|---|
| 1 | [✓ 2] | 3 | 4 |  |
| 21.8% | 48.8% | 7.4% | — | N=89 |

10. How would you describe the socio-economic make-up of the students in your school?

| Very High |  | Middle Class |  | Very Low |  |
|---|---|---|---|---|---|
| 1 | 2 | [✓ 3] | 4 | 5 |  |
| 1.9% | 17.5% | 56.3% | 24.3% | — | N=103 |

11. How variable is the range of socio-economic make-up of the students in your school?

| Everbody The Same |  |  | Everybody Different |
|---|---|---|---|
|  |  |  | N=103 |
| 1 | [✓ 2] | 3 | 4 |
| 6.8% | 49.5% | 34.0% | 9.7% |

12. What kind of role would you like to have as a teacher-librarian in the thinking skills project next year, the final year of the project?

13. Do you have any final comments about your participation in the thinking skills project that you would like to share?

|  |  |
|---|---|
| Negative comment | 23.1% |
| Neutral comment |  |
| Positive comment | 61.5% |

***APPENDIX A-5-2***

Name____________________

School____________________

## Interview Guide for Teachers

### Introduction

Last year in the thinking skills project people told us that to understand the student results we had to talk to teachers about what actually happened in the classroom. That is why we are visiting you today. Everything that you say to me will be kept STRICTLY CONFIDENTIAL.

I am going to be taking notes as we go along. I would also like to tape record the interview as a back up--sometimes I can't read my own handwriting. If it would make you uncomfortable to have the tape recorder on, just say so and I'll turn it off.

1. I am going to begin by asking you about the plans that you developed for teaching decision making in February to April. [Show planning sheet to interviewee.] Did you make any changes in these plans?

2. If changes were made, what led you to make these changes?

3. What problems did you encounter in teaching decision making?

Now I'd like to ask you about some of the decisions you made when teaching the unit.

4. Did you set the objectives for teaching decision making by yourself or were other people involved in the decision?

If with others,

who was involved

and how?

Circle the Level

- joint decision by all teachers involved with grade 5 instruction to pursue same objectives
- joint decision by two teachers to pursue same objectives
- partial agreement with other teacher(s) on objectives
- inform other teacher(s) of different objectives
- individual objective setting and informing of teacher-librarian
- individual objective setting

If alone, why?

time & space: (e.g. no place to meet)

motivation: (e.g. no encouragement for helping others)

knowledge & skill: (e.g. nobody in the school knows anything about teaching thinking skills)

other:

5. Were other people involved in the planning of your decision making lessons, or was this done by yourself alone?

If with others, who was involved

and how?

If alone, why? (e.g. for the same reasons as Q4)

were there new factors?

Circle the Level

joint construction of plans by all teachers involved with grade 5 instruction

joint construction of plans by two teachers

division of labour

informal sharing of plans

individual planning

6. Were other people involved in the delivery in the classroom of your decision making lessons, or was this done by yourself alone?

If with others, who was involved

and how?

If alone, why? (for the same reasons as Q4)

were there new factors?

| Circle the Level |
|---|
| mobile teacher(s) and combined activity centres |
| mobile teacher(s) or combined activity centres |
| exchanging materials |
| individual delivery making use of outside resources |
| individual delivery |

**7. Was anyone else involved when you were deciding how well your decision making lessons went, or was this done by yourself alone?**

If with others, who was involved

and how?

If alone, why? (for the same reasons as Q4)

were there new factors?

Circle the Level

- peer coaching (observation and feedback involving all teachers involved with grade 5 instruction)
- peer coaching (observation and feedback involving two teachers)
- formal discussion of observations
- informal discussion of shared anecdotes
- one-way observation and feedback
- informal relating of shared anecdotes
- no feedback

8. Were other people involved in the evaluation of students' progress in decision making, or was this done by yourself alone?

If with others, who was involved

and how?

If alone, why? (for the same reasons as Q4)

were there new factors?

Circle the Level

team marking by teachers

agreement on marking scheme by teachers

sharing marking schemes with teachers

individual marking

When you were assessing student progress, did you have students work alone or in small groups?

Did you have students work in small groups while completing the pretests?

9. How satisfied are you with the progress that students made in the thinking skills project?

| Very Satisfied | | | Very Dissatisfied |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

10. How would you describe the socio-economic make-up of the students in your school?

| Very High | | Middle Class | | Very Low |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

11. How variable is the range of social-economic make-up of students in your school?

| Everbody The Same | | | Everybody Different |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

12. Do have any final comments about your participation in the thinking skills project that you would like to share?

**USE ONLY THIS FORM IF YOU FOLLOWED THE SCHEDULE RECOMMENDED AT THE WORKSHOP (HANDOUT 3).**

Name____________________ School____________________

## WEEK 1

### 1. TEACHING ACTIVITIES

| | How many minutes did you spend on this activity? (0 - ? minutes) X̄ | SD | N |
|---|---|---|---|
| Day 1: Demonstration of Advantages & Disadvantages | 53.6 | 14.7 | 54 |
| Day 2: Practice Advantages & Disadvantages | 32.6 | 13.5 | 55 |
| Day 3: Practice Advantages & Disadvantages | 30.6 | 12.1 | 51 |
| Day 4: Practice Advantages & Disadvantages | 29.8 | 14.5 | 50 |
| Day 5: Quiz | 28.5 | 14.2 | 46 |

How satisfied were you with your teaching? [circle one]

1 very satisfied [✓ 2 satisfied] 3 unsatisfied 4 very unsatisfied

X̄ = 1.8
SD = .6
N = 53

### 2. CURRICULUM DECISION MAKING

| Indicate who was involved in making decisions about: | CHECK WHO WAS INVOLVED<br>1<br>Me | <br>2<br>With Teacher Librarian | <br>3<br>With Teacher(s) | <br>4<br>With Principal |
|---|---|---|---|---|
| setting objectives | 95% | 24% | 26% | 10% |
| planning lessons | 95 | 22 | 29 | 2 |
| delivering lessons to students | 98 | 17 | 5 | — |
| assessing student work | 97 | 14 | 5 | 2 |

N = 58

If you worked with someone else CIRCLE when you met:

prep time 29% recess 41% before school 30% after school 41% lunch 41% N = 27

other —____________________
please specify

How satisfied were you this week with this method of deciding? [circle one]

1 very satisfied [✓ 2 satisfied] 3 unsatisfied 4 very unsatisfied

X̄ = 1.8
SD = .5
N = 54

COMMENTS? N = 26

***APPENDIX A-6-1b***

USE ONLY THIS FORM IF YOU
FOLLOWED THE SCHEDULE RECOMMENDED AT THE WORKSHOP (HANDOUT 3).

Name________________________ School________________________

## WEEK 2

### 1. TEACHING ACTIVITIES

| | How many minutes did you spend on this activity? (0 - ? minutes) $\bar{x}$ | SD | N |
|---|---|---|---|
| Day 1: Demonstration of Criteria | 33.6 | 20.2 | 48 |
| Day 2: Practice Criteria | 32.7 | 16.6 | 49 |
| Day 3: Practice Criteria | 31.8 | 16.9 | 46 |
| Day 4: Practice Criteria | 30.7 | 14.6 | 37 |
| Day 5: Quiz | 28.5 | 11.8 | 30 |

How satisfied were you with your teaching? [circle one]

1 very satisfied   2 [✓ satisfied]   3 unsatisfied   4 very unsatisfied

$\bar{x}$ = 1.8
SD = .6
N = 50

### 2. CURRICULUM DECISION MAKING

| Indicate who was involved in making decisions about: | CHECK WHO WAS INVOLVED<br>Me | With Teacher Librarian | With Teacher(s) | With Principal |
|---|---|---|---|---|
| setting objectives | 94% | 28% | 32% | 11% |
| planning lessons | 96 " | 25 " | 28 " | 4 " |
| delivering lessons to students | 98 " | 13 | 6 | — |
| assessing student work | 94 | 14 | 10 | — |

N=53

If you worked with someone else CIRCLE when you met:

33% prep time   33% recess   12% before school   30% after school   39% lunch   N= 33

other 12%
please specify

How satisfied were you this week with this method of deciding? [circle one]

1 very satisfied   2 [✓ satisfied]   3 unsatisfied   4 very unsatisfied

$\bar{x}$ = 1.8
SD = .5
N = 44

COMMENTS? N = 20

***APPENDIX A-6-1c***

**USE ONLY THIS FORM IF YOU**
**FOLLOWED THE SCHEDULE RECOMMENDED AT THE WORKSHOP (HANDOUT 3).**

Name______________________School______________________

## WEEK 3

### 1. TEACHING ACTIVITIES

| | How many minutes did you spend on this activity? (0 - ? minutes) $\bar{X}$ | SD | N |
|---|---|---|---|
| Day 1: Review Criteria | 31.5 | 19.2 | 47 |
| Day 2: Practice Criteria | 27.6 | 13.5 | 46 |
| Day 3: Practice Criteria | 31.1 | 14.5 | 41 |
| Day 4: Quiz | 29.3 | 13.8 | 5 |

How satisfied were you with your teaching? [circle one]

1 very satisfied    2 [✓ satisfied]    3 unsatisfied    4 very unsatisfied

$\bar{X}$ = 1.9
SD = .7
N = 46

### 2. CURRICULUM DECISION MAKING

| Indicate who was involved in making decisions about: | CHECK WHO WAS INVOLVED Me | With Teacher Librarian | With Teacher(s) | With Principal |
|---|---|---|---|---|
| setting objectives | 95% | 17% | 34% | 8% |
| planning lessons | 96 . | 21 . | 30 | 2 . |
| delivering lessons to students | 98 | 9 | 8 | — |
| assessing student work | 96 | 8 | 11 | — |

N = 53

If you worked with someone else CIRCLE when you met:

37% prep time    44% recess    18% before school    44% after school    41% lunch    N = 27

other —
please specify

How satisfied were you this week with this method of deciding? [circle one]

1 very satisfied    2 [✓ satisfied]    3 unsatisfied    4 very unsatisfied

$\bar{X}$ = 2.0
SD = .7
N = 45

COMMENTS? N = 27

USE ONLY THIS FORM IF YOU DID NOT
FOLLOW THE SCHEDULE RECOMMENDED AT THE WORKSHOP (HANDOUT 3).

Name__________________________ School______________________________

## WEEK 1

### 1. TEACHING ACTIVITIES

| Brief Description of Activity | How many minutes did you spend on this activity? (0 - ? minutes) |
|---|---|
| Day 1: | |
| Day 2: | |
| Day 3: | |
| Day 4: | |
| Day 5: | |

**How satisfied were you with your teaching? [circle one]**

very satisfied     satisfied     unsatisfied     very unsatisfied

### 2. CURRICULUM DECISION MAKING

| Indicate who was involved in making decisions about: | CHECK WHO WAS INVOLVED<br>Me | With Teacher Librarian | With Teacher(s) | With Principal |
|---|---|---|---|---|
| setting objectives | | | | |
| planning lessons | | | | |
| delivering lessons to students | | | | |
| assessing student work | | | | |

**If you worked with someone else CIRCLE when you met:**

prep time     recess     before school     after school     lunch

other______________________________
please specify

**How satisfied were you this week with this method of deciding? [circle one]**

very satisfied     satisfied     unsatisfied     very unsatisfied

COMMENTS?______________________________

**USE ONLY THIS FORM IF YOU DID NOT FOLLOW THE SCHEDULE RECOMMENDED AT THE WORKSHOP (HANDOUT 3).**

Name________________________ School______________________________

# WEEK 2

## 1. TEACHING ACTIVITIES

| Brief Description of Activity | How many minutes did you spend on this activity? (0 - ? minutes) |
|---|---|
| Day 1: | |
| Day 2: | |
| Day 3: | |
| Day 4: | |
| Day 5: | |

**How satisfied were you with your teaching? [circle one]**

very satisfied    satisfied    unsatisfied    very unsatisfied

## 2. CURRICULUM DECISION MAKING

| | CHECK WHO WAS INVOLVED | | | |
|---|---|---|---|---|
| Indicate who was involved in making decisions about: | Me | With Teacher Librarian | With Teacher(s) | With Principal |
| setting objectives | | | | |
| planning lessons | | | | |
| delivering lessons to students | | | | |
| assessing student work | | | | |

**If you worked with someone else CIRCLE when you met:**

prep time    recess    before school    after school    lunch

other____________________________________________
please specify

**How satisfied were you this week with this method of deciding? [circle one]**

very satisfied    satisfied    unsatisfied    very unsatisfied

COMMENTS?____________________________________________

USE ONLY THIS FORM IF YOU DID NOT
FOLLOW THE SCHEDULE RECOMMENDED AT THE WORKSHOP (HANDOUT 3).

Name____________________________ School____________________________

# WEEK 3

## 1. TEACHING ACTIVITIES

| Brief Description of Activity | How many minutes did you spend on this activity? (0 - ? minutes) |
|---|---|
| Day 1: | |
| Day 2: | |
| Day 3: | |
| Day 4: | |
| Day 5: | |

**How satisfied were you with your teaching? [circle one]**

very satisfied    satisfied    unsatisfied    very unsatisfied

## 2. CURRICULUM DECISION MAKING

| Indicate who was involved in making decisions about: | CHECK WHO WAS INVOLVED | | | |
|---|---|---|---|---|
| | Me | With Teacher Librarian | With Teacher(s) | With Principal |
| setting objectives | | | | |
| planning lessons | | | | |
| delivering lessons to students | | | | |
| assessing student work | | | | |

**If you worked with someone else CIRCLE when you met:**

prep time    recess    before school    after school    lunch

other________________________________
please specify

**How satisfied were you this week with this method of deciding? [circle one]**

very satisfied    satisfied    unsatisfied    very unsatisfied

COMMENTS?________________________________

***APPENDIX A-7-1***

# TEACHER LIBRARIAN ACTIVITIES

## WEEK 1

Name______________________ School______________________

○ = Most Frequent Response

**Indicate the extent to which you were involved this week in the following curriculum decisions about the thinking skills project.**

| | 1 | 2 | 3 | 4 | $\bar{x}$ | SD | N |
|---|---|---|---|---|---|---|---|
| 1. Setting Objectives [circle one] | [✓ Highly Involved] | Moderately Involved | Slightly Involved | Not Involved | 2.5 | 1.3 | 21 |
| 2. Planning Lessons [circle one] | [✓ Highly Involved] | Moderately Involved | Slightly Involved | Not Involved | 2.4 | 1.2 | 21 |
| 3. Delivering lessons to Students [circle one] | [✓ Highly Involved] | Moderately Involved | Slightly Involved | Not Involved | 2.0 | 1.2 | 2 |
| 4. Assessing Student Work [circle one] | [✓ Highly Involved] | Moderately Involved | Slightly Involved | Not Involved | 1.9 | 1.2 | 25 |

**Is there more than one grade 5 teacher in your school?** Yes 81% No 19% N= 26

**If there is more than one grade 5 teacher in your school, indicate who you worked with on the thinking skills project. [check one]**

| | | |
|---|---|---|
| - I worked exclusively with one grade 5 teacher. | 19.0 % | N= 21 |
| - I worked more with one grade 5 teacher than the other(s). | 33.3 | |
| - I worked equally with all grade 5 teachers. | 14.3 | |
| - I did not work with any grade 5 teachers. | 33.3 | |

**How satisfied were you with your involvement in decision making about the thinking skills project this week? [circle one]**

| 1 | 2 | 3 | 4 | |
|---|---|---|---|---|
| very satisfied | satisfied | [✓ unsatisfied] | very unsatisfied | $\bar{x}$ = 2.6<br>SD = 1.1<br>N= 23 |

COMMENTS? N= 17

***APPENDIX A-7-2***

# TEACHER LIBRARIAN ACTIVITIES

## WEEK 2

Name__________________________ School_______________________

**Indicate the extent to which you were involved this week in the following curriculum decisions about the thinking skills project.**

| | 1 | 2 | 3 | 4 | $\bar{x}$ | SD | N |
|---|---|---|---|---|---|---|---|
| 1. Setting Objectives [circle one] | [✓ Highly Involved] | Moderately Involved | Slightly Involved | Not Involved | 2.1 | 1.2 | 24 |
| 2. Planning Lessons [circle one] | [✓ Highly Involved] | Moderately Involved | Slightly Involved | Not Involved | 2.0 | 1.2 | 25 |
| 3. Delivering lessons to Students [circle one] | [✓ Highly Involved] | Moderately Involved | Slightly Involved | Not Involved | 1.7 | 1.1 | 25 |
| 4. Assessing Student Work [circle one] | [✓ Highly Involved] | Moderately Involved | Slightly Involved | Not Involved | 1.5 | .9 | 26 |

**Is there more than one grade 5 teacher in your school?** Yes 81% No 19% N= 26

**If there is more than one grade 5 teacher in your school, indicate who you worked with on the thinking skills project. [check one]**

| | | |
|---|---|---|
| - I worked exclusively with one grade 5 teacher. | 28.6% | N=21 |
| - I worked more with one grade 5 teacher than the other(s). | 9.5 | |
| - I worked equally with all grade 5 teachers. | 23.8 | |
| - I did not work with any grade 5 teachers. | 38.1 | |

**How satisfied were you with your involvement in decision making about the thinking skills project this week? [circle one]**

| 1 | 2 | 3 | 4 | |
|---|---|---|---|---|
| very satisfied | satisfied | [✓ unsatisfied] | very unsatisfied | $\bar{x}$ = 2.5<br>SD = 1.0<br>N = 22 |

COMMENTS? N= 12

***APPENDIX A-7-3***

# TEACHER LIBRARIAN ACTIVITIES

## WEEK 3

Name______________________________ School____________________

**Indicate the extent to which you were involved this week in the following curriculum decisions about the thinking skills project.**

| | 1 | 2 | 3 | 4 | $\bar{x}$ | SD | N |
|---|---|---|---|---|---|---|---|
| 1. Setting Objectives **[circle one]** | [✓ Highly Involved] | Moderately Involved | Slightly Involved | Not Involved | 1.8 | 1.1 | 21 |
| 2. Planning Lessons **[circle one]** | [✓ Highly Involved] | Moderately Involved | Slightly Involved | Not Involved | 2.0 | 1.2 | 21 |
| 3. Delivering lessons to Students **[circle one]** | [✓ Highly Involved] | Moderately Involved | Slightly Involved | Not Involved | 1.7 | 1.1 | 21 |
| 4. Assessing Student Work **[circle one]** | [✓ Highly Involved] | Moderately Involved | Slightly Involved | Not Involved | 1.7 | 1.0 | 20 |

**Is there more than one grade 5 teacher in your school?** Yes 86% No 14% N = 21

**If there is more than one grade 5 teacher in your school, indicate who you worked with on the thinking skills project. [check one]**

| | | |
|---|---|---|
| - I worked exclusively with one grade 5 teacher. | 31.3 | N=16 |
| - I worked more with one grade 5 teacher than the other(s). | 6.3 | |
| - I worked equally with all grade 5 teachers. | 18.8 | |
| - I did not work with any grade 5 teachers. | 43.8 | |

**How satisfied were you with your involvement in decision making about the thinking skills project this week? [circle one]**

| 1 | 2 | 3 | 4 | |
|---|---|---|---|---|
| very satisfied | satisfied | [✓ unsatisfied] | very unsatisfied | $\bar{x} = 2.3$<br>SD = .8<br>N = 18 |

COMMENTS? N = 10

***APPENDIX A-8***

NAME_________________ SCHOOL_________________ ROLE

| | N |
|---|---|
| ___ TEACHER | 63 |
| ___ TEACHER-LIBRARIAN | 24 |
| ___ PRINCIPAL | 34 |
| | 121 |

## SCHOOL CHARACTERISTICS SURVEY

*Please indicate the degree to which you agree or disagree (1 = Strongly Disagree, 6 = Strongly Agree) with each statement below by circling the appropriate numeral to the right of each statement.*

○ = Median Response

| | Strongly Disagree | | | | | Strongly Agree |
|---|---|---|---|---|---|---|
| 1. The staff at this school like being here; I would describe us as a satisfied group. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 2. I like the way things run at this school. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 3. I have "freedom within limits" at this school; I know what is expected of me but I also have freedom to be creative. | 1 | 2 | 3 | 4 | 5 | [✓ 6] |
| 4. At this school, teachers are allowed to teach in their own styles. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 5. At this school, we agree on the objectives we're trying to achieve with students. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 6. If most staff at this school feel that another staff member is not doing a good job, they will exert some pressure on him or her to improve. | 1 | 2 | [✓ 3] | 4 | 5 | 6 |
| 7. I approve of the ways in which most of the teachers in this school teach. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 8. Most staff at this school have values and philosophies of education similar to my own. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 9. Staff at this school share a high level of commitment to student learning. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 10. Discussion about school goals and means of achieving them is a regular part of our school faculty or inservice meetings. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 11. We have explicit goals for student achievement in this school. | 1 | 2 | 3 | [✓ 4] | 5 | 6 |
| 12. Teachers get good help or advice from other staff at this school when they have a teaching problem. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 13. The methods used in this school to evaluate teaching are objective and fair. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 14. Teachers know what they are being evaluated on in this school. | 1 | 2 | 3 | 4 | 5 | [✓ 6] |
| 15. New teachers in this school know what our faculty is trying to accomplish and what will be expected of them as teachers. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |

| | Strongly Disagree | | | | | Strongly Agree |
|---|---|---|---|---|---|---|
| 16. The faculty makes new teachers feel very welcome at this school. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 17. All staff share responsibility for our school's successes and shortcomings. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 18. Rules for student behaviour are consistently enforced by staff at this school, even for who are not in their classes. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 19. In this school, staff participate in establishing rules for student conduct. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 20. At this school, I have many opportunities to [illegible] new things. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 21. Evaluation of teaching is used to help teachers improve at this school. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 22. New ideas presented at inservices are discussed afterwards by staff in this school. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 23. I feel a sense of pride in my work at this school. | 1 | 2 | 3 | 4 | 5 | [✓ 6] |
| 24. Most of our students' parents support the things we do. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 25. In this school, staff participate in selecting instructional texts and materials. | 1 | 2 | 3 | 4 | 5 | [✓ 6] |
| 26. In this school, staff participate in determining the type and content of inservices we have. | 1 | 2 | 3 | [✓ 4] | 5 | 6 |
| 27. Staff participate in determining appropriate instructional methods and techniques in this school. | 1 | 2 | 3 | 4 | [✓ 5] | 6 |
| 28. Teachers are encouraged to modify the curriculum to meet their own students' need. | 1 | 2 | 3 | 4 | 5 | [✓ 6] |

# RESOURCE PACKAGE FOR TEACHING DECISION MAKING

## 1. Growth Scheme for Decision Making

The growth scheme describes how students' thinking about a decision problem changes as they mature. The levels in the scheme provide targets for instruction. The goal for grade 5 is to bring the class to level 4, although for some students level 3 is a more realistic aspiration.

## 2. Consolidate Your Understanding

This is an exercise in which you have to describe what students at various levels of the growth scheme would do in response to a decision making problem.

## 3. Example of a Teaching Schedule

Each teacher will want to develop his/her own schedule for improving student performance. This schedule provides for three segments spread over three months; each segment involves 30 minutes per day for 3 to 5 days.

## 4. Example of Teaching Strategy

The first part of the teaching strategy shows how a teacher might introduce the advantages/disadvantages level, using an everyday example. The second part shows how to introduce the criteria level, using the same example.

## 5. Example of a Practice Exercise

Activities that provide students with practice can be developed using content from any subject. This example provides practice at the advantages/disadvantages level, using content from the topic Rainforests. There are units available for Deserts and Rainforests that provide more examples of decision making exercises.

## 6. Assessing Decision Making

This two page article gives a method for assessing decision making skill. The article contains a set of indicators for judging students' work.

## 7. Consolidate Your Understanding

Some of the examples of student work given here are much more difficult to interpret than others. The interpretations of these responses are given at the end of the package.

## 8. Examples of Mini Quizzes

It is recommended that regular quizzes be given, for example at the end of each weekly segment. Two examples of quizzes using everyday content are given. Other quizzes can easily be devised using the same format for decision problems using subject content. These quizzes can be marked by the teacher and/or further practice can be provided to students by having them rate the decision making strategies of others in the class. An assessment scheme is provided.

## 9. Schedule of Events for 1988-89

This final item is a schedule showing the main activities for teachers and teacher librarians, and the information requests associated with each activity.

## GROWTH SCHEM [illegible] .CISION-MAKING

**LEVELS** — **RULES** — **EXAMPLE OF FRAMEWORK (WHERE SHOULD THE NEW SHOPPING MALL BE BUILT)**

### 1. Justifying one Alternative

1. *Think of a good alternative*
2. *Think of an advantage it has*

| Build Mall Downtown |
|---|
| near our school so I can go to McDonald's |

### 2. Comparing Advantages of Several Alternatives

1. Think of a good alternative
   *.Add other alternatives*
2. *Think of some advantages of each*
3. *Consider advantages when choosing*

| Build the Mall Downtown | Build tho Mall East of City |
|---|---|
| -lots of people already go downtown<br>-good roads<br>-downtown merchants want it here | -good flat land<br>-no buildings would have to be torn down<br>-people in east end would have a place to shop |

### 3. Comparing Advantages and Disadvantages

1. Think of the alternatives
2. Think of some advantages of each
   *.Add some disadvantages of each*
3. *Consider advantages and disadvantages when choosing*

| | Build the Mall Downtown | Build the Mall East of the City |
|---|---|---|
| Advantages | -lots of people available<br>-good roads<br>-downtown merchants want it here | -good flat land<br>-no buildings would have to be torn down<br>-would give people in east end a place to shop |
| Disadvantages | -would have to move some stores<br>-land is very expensive<br>-requires bylaw change | -would have to build new roads<br>-farmland would be lost |

### 4. Comparing alternatives on specific criteria

1. Think of the alternatives
2. *Think of criteria*
   *.think of some advantages and disadvantages*
   *.find similarities among the advantages and disadvantages*
   *.add advantages and disadvantages for each alternative in each category of criteria*
3. *Add up the information*
   *.put + for each advantage and - for each disadvantage*
   *.add the +'s and -'s*

| | Build the mall downtown | Build the mall east of city | Build the mall west of city |
|---|---|---|---|
| What downtown merchants want | + | - | - |
| Cost of Land | - | + | + |
| Availability of shoppers | + | + | - |
| Suitability of roads | + | - | - |

HANDOUT 1

LEVELS | RULES | EXAMPLE OF FRAMEWORK (WHERE SHOULD THE NEW SHOPPING MALL BE BUILT)

5. Ranking, Rating, Weighting Alternatives on Criteria

1. Think of the alternatives
2. Think of criteria
3. *Rate criteria*
   - *.weight criteria in terms of importance*
4. Add up the information
   - *.give a 1-10 score to each +/-*
   - *.multiply the scores by the criteria weights*

| | Criteria Weights | Ranking of Alternatives on Criteria | | |
|---|---|---|---|---|
| | | Downtown | East of City | West of City |
| What downtown merchants want | 2 | 10 | 7 | 3 |
| Cost of Land | 4 | 1 | 8 | 8 |
| Availability of Shoppers | 5 | 9 | 6 | 4 |
| Suitability of Present Roads | 2 | 3 | 1 | 4 |

6. Classify alternatives and criteria

1. Think of the alternatives
   - *.group the alternatives*
   - *.think of new alternatives in each group*
   - *.think of new groups*
2. Think of criteria
   - *.group criteria*
   - *.think of new criteria in each group*
   - *.think of new groups*
3. Rate criteria
4. Add up the information

| Criteria | Importance of Criterion | Rating of Alternatives | | | | |
|---|---|---|---|---|---|---|
| | | Mall Downtown | | Mall Outside City | | |
| | | At Four Corners | On the Waterfront | Eastern Area | Western Area | Northern Area |
| Political Factors: | | | | | | |
| -what merchants want | 3 | 10 | 9 | 3 | 3 | 4 |
| -what farmers want | 1 | 8 | 7 | 1 | 1 | 6 |
| -changes in bylaw required | 1 | 4 | 4 | 9 | 9 | 9 |
| Cost Factors: | | | | | | |
| -cost of land | 2 | 1 | 2 | 8 | 8 | 10 |
| -cost of roads | 1 | 9 | 8 | 1 | 4 | 6 |
| Markets: | | | | | | |
| -number of shoppers living in the area | 2 | 9 | 7 | 6 | 4 | 3 |
| -other shopping areas available to shoppers | 3 | 5 | 3 | 9 | 8 | 9 |

[Note: Italics indicates new or revised rules]

# CONSOLIDATING UNDERSTANDING OF GROWTH

Imagine that your students have been presented with the following problem:

> A group of grade 6 students found a newspaper article that claimed that plants grow better if music is played to them. They decided that this was probably true but they couldn't agree on what kind of music would work the best. They decided to design an experiment to find out.

Describe the typical responses of students at levels 1, 2, 3, and 4 of the growth scheme for experimental thinking. If you have time, go on to describe level 5.

## EXAMPLE OF A SCHEDULE FOR DECISION MAKING INSTRUCTION

The overall goal is to bring all grade 5 students to level 4 (explicit criteria) of the growth scheme for decision making. Not all students will progress at the same rate. Some may not reach this level in grade 5; others may go beyond it. The important thing is that every child improve at least one level in the next few months.

Each teacher will develop his/her own schedule for reaching the goal. One schedule that many teachers have found effective is to follow a three step plan. Each step takes about one week of class time, 30 minutes per day:

1. Advantages and Disadvantages **One Week in February**

   - introduce the advantages/disadvantages level of decision making using an everyday decision problem **(1 day)**
   - consolidate with exercises or activities in which students have to identify advantages and disadvantages in decision making problems in specific subjects **(3 days)**
   - mini quiz **(1 day)**

2. Criteria **One Week in March**

   - introduce the criteria level of decision making using an everyday decision problem **(1 day)**
   - consolidate with exercises or activities in which students have to identify criteria in decision making problems in specific subjects **(3 days)**
   - mini quiz **(1 day)**

3. Review **One Week in April**

   - review the criteria level of decision making with the class, using subject specific content **(1 day)**
   - consolidate with exercises or activities **(2 days)**

## TEACHING DECISION MAKING

1. [*Have students perform the skill.*]

Present students with this situation:

> There has been a lot of vandalism in Elmdale School. The principal has announced that if acts of vandalism continue "action will be taken". Later the same day a student sees a very close friend in the washroom. The friend is scratching a particularly nasty four letter word into the wall.

Ask students what they think this student should do.

2. [*Display the lowest level of performance likely to be encountered in the class.*]

Write the suggestions down on the board. When students propose a course of action ask them to give some reason why it would be a good idea. Make a chart on the board to record the suggestions. For example:

| | LIST OF CHOICES | | | | |
|---|---|---|---|---|---|
| | Hope you don't get caught | Try to cover up mess | Report friend to principal | Persuade friend to confess | Scratch in your own word |
| Reasons | friend will be glad you didn't squeal | principal won't be so mad | principal will be happy culprit is caught | vandalism will be reduced | friend will be impressed |

| | |
|---|---|
| Teacher: | Imagine that the student in the story is given all these ideas. What can the student do to reach a decision? |
| Students: | Pick the suggestion with the best reason under it. |

3. [*Demonstrate the inadequacies of the lowest level.*]

| | |
|---|---|
| Teacher: | That sounds sensible. But our chart just looks at the good things about each suggestion. Only the advantages are considered. Wouldn't we be wise to look at some of the disadvantages of each suggestion? What would be a disadvantage of "Hope you don't get caught"? |
| Students: | They might think you did it. |
| Teacher: | Is this information--that you might get blamed--important to you? Would you want to consider it when making up your mind? |

4. [*Stimulate the students to invent a new level of performance.*]

With the students, enlarge the chart to include the disadvantages of each suggested alternative course of action. Change the label "reasons" to advantages. Add a new row to the chart labelled disadvantages. If the class is slow to identify disadvantages ask supporters of one position to give the disadvantages of other positions; e.g., ask those who want to report the friend to the principal what's wrong with scratching in your own word, etc.

The new chart should look something like this:

| | Hope you don't get caught | Try to cover up mess | Report friend to principal | Persuade friend to confess | Scratch in your own word |
|---|---|---|---|---|---|
| Advantages | friend will be glad you didn't squeal | principal won't be so mad | principal will be happy culprit is caught | vandalism will be reduced | friend will be impressed |
| Disadvantages | you might get blamed for the damage; wall is still damaged | there will still be a mark on the wall | friend will be mad at you | friend might get into trouble | there will be even more damage to the wall |

Teacher: Now how should the student decide what to do?

Students: Pick the suggestion with the strongest advantages and least important disadvantages.

5. [*Consolidate the new level with a decision making problem that uses subject specific content.*]

6. [*If the preceding has been a review for students, continue to the next level.*]

We can do more to improve our chart. For three of the possible choices something is recorded about how the principal will react: circle these phrases and link them with a line.

Is there anything else in the chart that is similar? E.g., there is something about how the friend will react to most of the possible choices: circle these phrases and link them with lines. Continue to identify common features and link them with lines. The result should be a very confused looking chart with criss-crossed lines.

We could make a neat chart by rearranging the information so that everything is matched up. Use a plus to show advantages and a minus for disadvantages.

| | Hope you don't get caught | Try to cover up mess | Report friend to principal | Persuade friend to confess | Scratch in your own word |
|---|---|---|---|---|---|
| | you might get blamed<br>- | principal won't be mad<br>+ | principal will be happy culprit is caught<br>+ | | |
| | friend will be glad you didn't squeal<br>+ | | friend will be mad at you<br>- | friend might get into trouble<br>- | friend will be impressed<br>+ |
| | wall is still damaged<br>- | there will still be a mark on the wall<br>- | | | there will be even more damage to the wall<br>- |
| | | | | vandalism will be reduced<br>+ | |

Point out to students that there is a lot of missing information in this table--information that they have. Focus on the first row of the chart.

| | |
|---|---|
| Teacher: | What is this information about (principal won't be mad; principal will be happy)? |
| Students: | The principal's reaction. |
| Teacher: | We'll add this to the chart [*teacher writes in a new column on the far left "Principal's reaction"*]. And we'll call this new column "criteria" or things to consider when making up your mind [*teacher labels the column*]. |
| Teacher: | What could we add to the first row of our chart regarding the principal's reaction to "Hope you don't get caught." |
| Students: | principal will be mad. |
| Teacher: | to "persuade friend to confess"? |
| Students: | the principal will love that |
| Teacher: | to "scratch in your own word"? |
| Students: | principal will be furious. |

Complete the chart by filling in the missing criteria and the missing information about each alternative.

The chart should look like this:

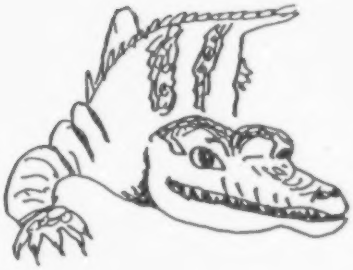
| | POSSIBLE CHOICES | | | | |
|---|---|---|---|---|---|
| Things to Consider | Hope you don't get caught | Try to cover up mess | Report friend to principal | Persuade friend to confess | Scratch in your own word |
| Principal's Reaction | you might get blamed<br>- | principal won't be mad<br>+ | principal will be happy culprit is caught<br>+ | principal will love that<br>+ | principal will be furious<br>- |
| Friend's Reaction | friend will be glad you didn't squeal<br>+ | friend will think you are a wimp<br>- | friend will be mad at you<br>- | friend might get into trouble<br>- | friend will be impressed<br>+ |
| Effect on the Wall | wall is still damaged<br>- | there will still be a mark on the wall<br>- | damage remains<br>- | damage remains<br>- | there will be even more damage to the wall<br>- |
| Effect on School Vandalism | will continue<br>- | will continue<br>- | reduced<br>+ | vandalism will be reduced<br>+ | will get worse<br>- |

| | |
|---|---|
| Teacher: | How do we know which choice to select? |
| Students: | Choose the one with the most +'s or fewest -'s. In this case, the best choice is to persuade the friend to confess. |

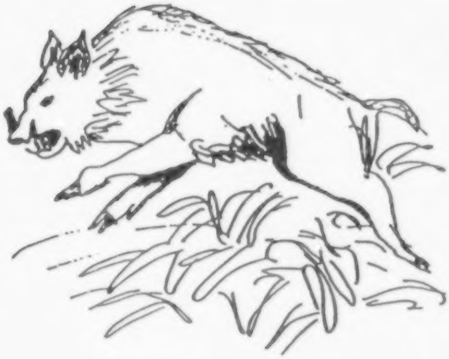
## WORKSHEET G

Task: Read the information about jungle pets. Which would make the best pet for someone living in a tropical rainforest?

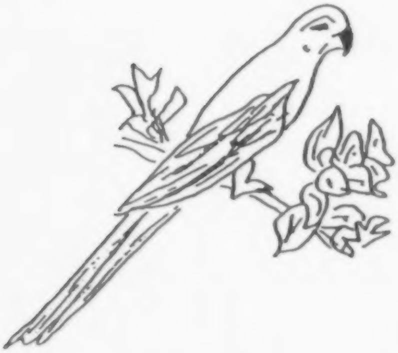
1. Make a decision-making chart that lists all 3 animals.
2. Show on your chart the advantages of each pet.
3. Show on your chart the disadvantages of each pet.
4. Pick the one that would make the best pet for someone living in a tropical rainforest. Why is it best?



The Cayman is a kind of alligator. He drifts along in the water ready to snap at the fish and turtles he eats. He has sharp teeth and strong jaws. Don't go swimming when he's around--he might snap at you.



The Wild Pig has sharp, razor-like tusks. Usually they travel wild in packs. But they can be tamed. Then they roam through the villages. The children find them fun.



The Parrot is one of the most beautiful birds of the rainforest. But it is hard to tell him from the brightly coloured flowers in the treetops. He eats many seeds and insects which are plentiful in the rainforest. Parrots can be trained to talk. They have wings and can fly away.

# CAN COGNITIVE THINKING SKILLS BE MEASURED?

John A. Ross, Professor and Head, OISE Trent Valley Centre

Of course they can. But it doesn't always happen. Sometimes courses that attempt to provide balanced coverage of content, skill and affect objectives end up measuring only the content objectives. The result is that students get a misleading message about the relative importance of content and teachers don't obtain the information they need about the effectiveness of their strategies for teaching cognitive skills.

All of us are more adept at finding out how much knowledge students have acquired than we are at determining the development of a child's thinking. And we tend to do what we are good at.

An analogy might be helpful. Measuring content (e.g., "describe the uses of the Amazon rainforest") is like judging a high jump competition. There is a clearly defined criterion — how high you can jump or how many facts you can remember — that makes it easy to determine how well students have done. Measuring cognitive skills (e.g., "how can the Amazon rainforest be protected") is like judging a gymnastics competition. There is no single criterion of performance; it is a matter of the quality, not the quantity, of what the student does. Grading the result is not a simple matter and judges may disagree.

There are some things that gymnastics judges and teachers can do to improve the quality of their assessments. The first is to be very clear about the dimensions of performance that count. The second is to share with other judges the particular meaning that you give to each dimension by examining specific cases together. The third is to be persistent: just as gymnastics judges need lots of experience before they are certified as expert appraisers, teachers who regularly measure thinking skills performance get better with practice.

What do these features of clarity, sharing and practice look like in the real world? What follows is a step by step procedure for developing effective measuring devices for thinking skills.

### 1. Recall the growth scheme for the objective to be measured.

The purpose of assessment is to obtain information about student progress. The article by Augustine in this journal suggests that the best way to describe student progress in cognitive skills is in terms of a growth scheme containing several levels on one or more dimensions. Let us take as an example the problem of placing students on a growth scheme for organizing a decision making problem.

### 2. Select an instrument type.

There are many ways of measuring student performance: classroom observation, individual interviews, multiple choice tests, and open ended instruments of various kinds. No single method is better than all the others; most teachers use a variety, depending on the specific assessment purpose. As an example, let's take the type of open ended item that might appear on a term test.

### 3. Write an item.

Writing an item is the easy part — much more difficult is developing a scheme to interpret responses. To write the item we need a description of the task that tells students what to do and a context (a situation involving geographic content) in which to do it. For example, to measure student ability to construct a decision making organizer: "Imagine that you are part of a UN team investigating the decline of the rainforests around the world. What action should be taken to protect the Amazon rainforest?"

This particular item wording is difficult because it gives students very few cues that would assist them in preparing a response. This is a conspicuous choice of the item writer. A much easier item would contain the same task but might provide material that students could use in their answers. For example, the item could provide information about existing conditions in the Amazon; it could list one or more courses of action that could be taken; it could indicate possible consequences of these actions and/or it could suggest criteria that the decision maker might wish to consider. These additional cues have the effect of reducing demands on students and would affect student performance, perhaps dramatically.

### 4. Develop a scheme for interpreting student answers.

Another strategy is to treat each dimension of growth as a separate indicator and award marks based on how well the dimension is addressed. This allows for finer distinctions and focussed feedback. Figure 1 provides an example that has been used extensively by teachers and researchers. For any student response, regardless of whether it is given in a point outline, chart, sentences or paragraphs, the assessor first determines how many alternatives are overtly considered by the student. If there is only one, this portion of the response is given zero; if more than one, a mark is awarded. The assessor then continues to the second and third indicators. This particular scheme is most suitable with students who are relatively unsophisticated in decision making strategies. Higher levels of performance could be easily added. For example, there might be an entry for compromise alternatives in the first indicator, classes of criteria in the second, etc.

The scheme given in Figure 1 refers only to the thinking skills portion of the students' work. It would be completely appropriate to award a second set of marks for students' knowledge. For example, marks could be awarded for the quality of the concepts used in the answer and for the volume and accuracy of information introduced. Just as a single essay can be marked for style and content, answers to cognitive skills items can be assessed for process and content.

**5. Try the instrument out with typical students and teachers.**

Does the instrument work? In practical terms, an effective test instrument is one that enables us to assess growth validly and reliably. This involves administering the item to a sample of typical students and then having their teachers interpret the responses. This process leads to the refinement of the items and its interpretive scheme. It also leads to the sharing of meanings and the practice that is the hallmark of expert assessors in education and in other fields.

Further information about the measurement of cognitive skills can be found in several books published by OISE Press: **Curriculum Development for Effective Instruction, Teaching Problem Solving and Geographic Thinking Skills.**

| | |
|---|---|
| **1. Identification of alternatives** | |
| • more than one explicit alternative | 1 mark |
| **2. Development of criteria** | |
| • primitive strategy for deciding (e.g. voting) | 1 mark |
| • identification of explicit advantages | 2 marks |
| • explicit advantages and disadvantages | 3 marks |
| • one explicit criterion applied to all alternatives | 4 marks |
| • more than one explicit criterion | 5 marks |
| **3. Summarizing information about values of alternatives** | |
| • use of quantitative strategy (e.g. +'s and -'s) | 1 mark |

**Figure 1: A Scheme for Interpreting Student Answers to a Decision Making Question**

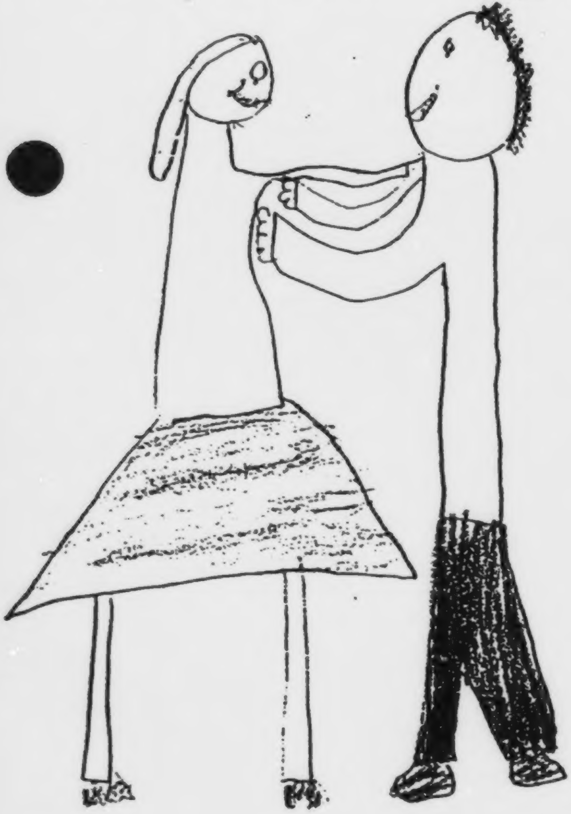
# INTERPRETING DECISION MAKING PERFORMANCE

Use the indicators of decision making skill to mark the following examples of student work. Items 1 to 9 are from grade 4 students; item 10 is from a grade 8 student.

The last page contains the typical marks awarded by teachers using this scheme.

2. Suppose your school was started 50 years ago. The class wants to have a birthday party for the school. How should the class decide what kind of party to have? ①

They should have a 50's dance.



2. Suppose your class is going on a school trip. How should the class decide where to go?

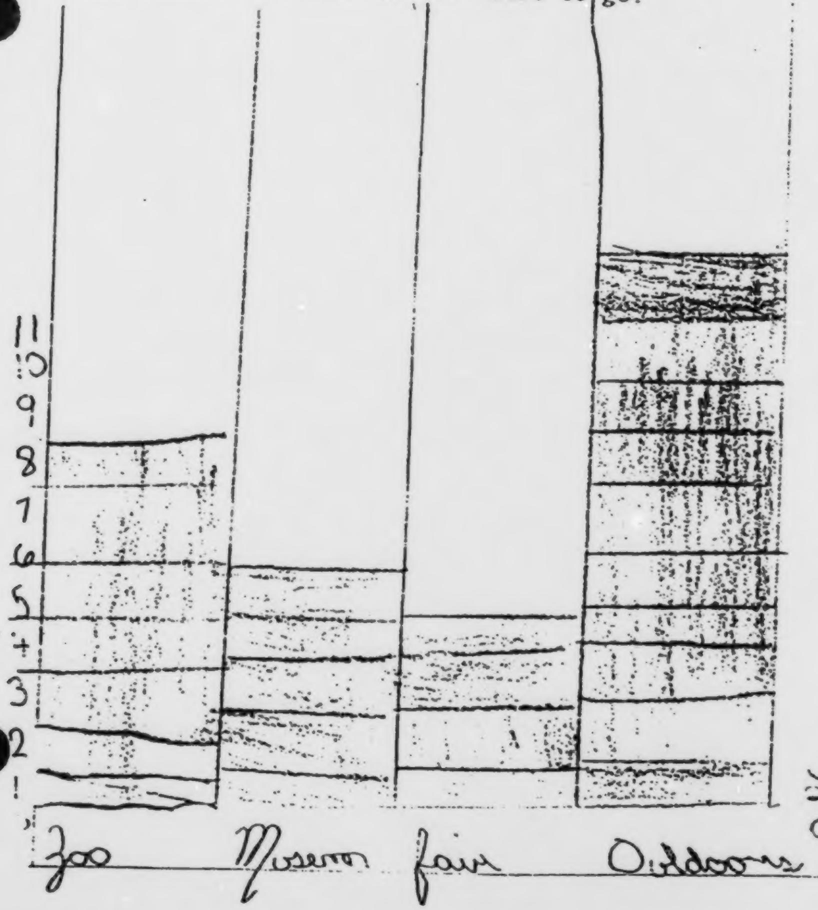
②

| | Tronto Zoo | Dongwon | Go to a real Balet |
|---|---|---|---|
| advantages | -exsiting<br>-big place | -big<br>-lots of things to do<br>-lots of animals | -pretty to watch<br>-exsiting |
| dis-advantages | -get lost<br>-get durty<br>-could be boring | -its hot even in winter<br>-get lost | -too long<br>-boring |

---

2. Suppose your class is going on a school trip. How should the class decide where to go?

③



The class would go outdoors

2. Suppose your school was started 50 years ago. The class wants to have a birthday party for the school. How should the class decide what kind of party to have? ④

Thay could have a party with candy and clean up the school so it looks good.

---

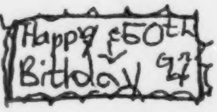
2. Suppose your class is going on a school trip. How should the class decide where to go? ⑤

they should flip a coin.

---

2. Suppose your school was started 50 years ago. The class wants to have a birthday party for the school. How should the class decide what kind of party to have? ⑥

They could blow up balloons and throw candys at the prineapal. They could have a cake that looked like this. ↓ It would be a surprise party so when the prinzapal came in they would all yell "Surprise!"



2. Suppose your school was started 50 years ago. The class wants to have a birthday party for the school. How should the class decide what kind of party to have?

⑦

| | School praty | Cuck Chesse Party | Home Party |
|---|---|---|---|
| advantages | - free time off school<br>- also fun! | - good pizza<br>- fun | - games<br>- cake |
| disadvantage | - <br>- | - you mite get to much food | - you mite not like the food<br>- boring maybe |

2. Suppose your class is going on a school trip. How should the class decide where to go?

⑧

I wod tolk it out with the class.

2. Suppose your school was started 50 years ago. The class wants to have a birthday party for the school. How should the class decide what kind of party to have?

⑨

| | a party at a resterant | a party at the school |
|---|---|---|
| advantages | wouldn't have to make any food. | |
| disadvantages | could coast alot. might not be much room | might not have enuf room. |

(10)

1. **Mike has a friend who is a really good athlete. This friend plans to earn his living playing sports. He tells Mike he is planning to quit school. Mike wants to help his friend. How should Mike decide what to do?**

Problem

Step 1 Mike has a friend who wants to earn money by playing sports and quite school:

Step 3 4

Step 2.

Mike

| Criteria | sports | education |
|---|---|---|
| ability | good, but his not good at all sports | good, he should be educated and then follow sports |
| age | once he gets older he won't be able to participate | no matter how old he can go to school, hold onto job long time |
| Experience | anyone can play sports what about ingurys | needs education more help. |

| Criteria | Sports | Tally | Education | Tally | Conclus |
|---|---|---|---|---|---|
| Ability | great player but not in all things | +<br>4 | he has the ability after educated and can go to sports. | +<br>5 | +<br>Educa |
| Age | once he gets old the team won't want him anymore | —<br>2 | no matter how old you still can go to school and work. | +<br>4 | Educa |
| Experience | and he won wouldn't be able to get a job with out education | —<br>3 | he will learn by going to school and will have many carreers! | +<br>4 | Educ |

scale 1 2 3 4 5

bad below average great excellent

Conclusion - step 5

Therefore Mikes friend would be better off if he continued with his schooling and after he was done he could continue with sports, because once he gets to old or gets injured he can't participate but with an education he can get another job

## MARKING DECISION MAKING ITEMS

The typical marks assigned to these items are:

| Item | Alternatives | Criteria | Summary | Total |
|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 |
| 2 | 1 | 3 | 0 | 4 |
| 3 | 1 | 1 | 1 | 3 |
| 4 | 1 | 0 | 0 | 1 |
| 5 | 0 | 1 | 0 | 1 |
| 6 | 1 | 0 | 0 | 1 |
| 7 | 1 | 3 | 0 | 4 |
| 8 | 0 | 0 | 0 | 0 |
| 9 | 1 | 3 | 0 | 4 |
| 10 | 1 | 5 | 1 | 7 |

# EXAMPLES OF DECISION MAKING QUIZZES

## Everyday Life Quizzes

1. Suppose your class is going on a school trip.
   How should the class decide where to go?

2. Suppose your school was started 50 years ago.
   The class wants to have a birthday party for the school.
   How should the class decide what kind of party to have?

## Subject Specific Quizzes

1. Nutrition

   Suppose your class is asked to plan the menu for a school lunch.
   How should you decide what to serve?

2. Mexico

   Suppose you were going to Mexico in February.
   Make a list of 8 pieces of clothing that you could take.
   Then select the 4 pieces that would be best.

## -THINKING SKILLS PROJECT 1988-89
## SCHEDULE OF EVENTS

| | January | February | March | April | May |
|---|---|---|---|---|---|
| **Grade 5 Teachers** | | | | | |
| Activities | Curriculum Planning | Teaching Advantages/ Disadvantages | Teaching Criteria | Reviewing Criteria | |
| Information Requests | Student Pretest and Teacher Style Survey | Teacher Activities Survey | Teacher Activities Survey | Teacher Activities Survey and Student Posttest | *Site Visit |
| **Teacher-Librarians** | | | | | |
| Activities | Curriculum Planning | Supporting Teachers | Supporting Teachers | Supporting Teachers | |
| Information Requests | Teacher Style Survey | Librarian Activities Survey | Librarian Activities Survey | Librarian Activities Survey | *Site Visit |

*About half the schools will be involved in a further data collection involving a half-day visit of the research team to the school. Each grade 5 teacher and teacher-librarian will be interviewed and will be asked to respond to a survey about school climate. There will be NO classroom observation.

**ALL INFORMATION PROVIDED BY PROJECT PARTICIPANTS WILL BE KEPT STRICTLY CONFIDENTIAL.**

## DIRECTIONS FOR JANUARY DATA COLLECTION

## GRADE 5 TEACHERS

1. **ADMINISTER THE PRETEST**

   Give every second student Form A; the rest of the students should get Form B.

   Use the **Student Record Form** to record which students received Form A and which Form B. This form will be returned to you before the posttest.

   **No Marking Is Required.**

2. **COMPLETE THE TEACHER STYLE SURVEY**

   The teacher style survey contains 16 statements about teaching. Please indicate the extent to which you agree or disagree about each. There are no right or wrong answers; this is an attitude survey.

3. **COMPLETE THE TEACHING SCHEDULE**

   Record the dates that you **ANTICIPATE** that you will be completing each of the teaching tasks. We understand that there may be changes to your schedule as the project goes on.

   Feel free to write in additional or different tasks, if that is your choice.

4. Return in SEALED ENVELOPE to [redacted]

***APPENDIX B-2b***

Name________________________ School________________________

## STUDENT RECORD FORM

| STUDENT NAME | PRETEST (FORM A OR B) |
|---|---|
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## DIRECTIONS FOR JANUARY DATA COLLECTION

## GRADE 5 TEACHER LIBRARIANS

1. **COMPLETE THE TEACHER STYLE SURVEY**

   The teacher style survey contains 16 statements about teaching. Please indicate the extent to which you agree or disagree about each.

   There are no right or wrong answers; this is an attitude survey.

2. Return in SEALED ENVELOPE to [redacted]

Name______________________________ School__________________________________

## ANTICIPATED SCHEDULE

| TASKS | EXPECTED DATE |
|---|---|
| **FIRST WEEK** [e.g., February] | |
| - introduce advantages/disadvantages level (1 day) | |
| - consoldiate advantages/disadvantages level (3 days) | |
| - mini quiz (1 day) | |
| - other activities (?) | |
| **SECOND WEEK** [e.g., March] | |
| - introduce criteria level (1 day) | |
| - consolidate criteria level (3 days) | |
| - mini quiz (1 day) | |
| - other activities (?) | |
| **THIRD WEEK** [e.g., April] | |
| - review criteria level (1 day) | |
| - consolidate criteria level (2 days) | |
| - other activities (?) | |
| **OTHER WEEKS** (?) | |

***APPENDIX B-3a***

The Ontario Institute for Studies in Education
Trent Valley Centre

P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

1989 02 02

TO: **THIS LETTER SENT TO TEACHERS & TEACHER-LIBRARIANS WHO HAVE NOT SUBMITTED THEIR MATERIALS**

FROM: John Ross,
OISE Trent Valley Centre

RE: Request for Thinking Skills Information

If you have already sent in the information requested at the January thinking skills workshop (student pretests, teaching plans and teacher style survey) please ignore this letter. If you have not sent in the information, I urge you to do so as soon as possible. I know how busy you are this month, but I'll bet you are going to be just as busy next month. The earlier the project gets started in your classroom, the sooner you will start to see improvements in your students' thinking.

When packaging your materials in the sealed envelope to be sent to OISE via Carl Ritchey at the Hopkins Street Consultants' Office, it is important to put your name and school on all the forms. It is very important that we are able to match up all the pieces of information--remember, **ALL INDIVIDUAL DATA WILL BE KEPT STRICTLY CONFIDENTIAL.**

The planning committee was very impressed with the quality of the activities produced at the workshop. I think you are going to find them to be very useful. They are being printed at the Board Office today: they will be in your school next week.

I hope to hear from you soon.

John

Affiliated with the University of Toronto

***APPENDIX B-3b***

## DURHAM THINKING SKILLS
## FOLLOW-UP #2

March 17, 1989

Dear Teacher (First Name),

We realize that you've been very busy, but we would really appreciate it if you could dust off your Thinking Skills materials and send them in. It's not too late to start the project, but we urge you to do so ASAP.

If you have misplaced your Thinking Skills package, just give us a call at 705-742-8827. We would really like to hear from you!

Yours truly,
Anne Hogaboam

***APPENDIX B-3c***

**This letter is to go out to librarians who have NOT sent in the week 1 survey form**

March 16, 1989

To:

From: John Ross
OISE Trent Valley Centre

Re: Thinking Skills Project

We missed hearing from you!

If the teachers in your school were teaching decision making skills in the month of February, please fill out the "Week 1 Activity Form" that we sent you earlier. An extra copy is enclosed if you need it.

If the teachers in your school did not teach decision making in February, it is not too late for them to start now. [When all the teachers have completed the activities planned for the first week of their schedules, or at the end of March if they are not finished by then], please fill out the attached form and send it in the attached envelope to us, care of Carl Ritchey at Hopkins Road.

We look forward to learning about your experiences helping teachers improve children's thinking skills.

**This letter is to go out to teachers who have NOT sent in the week 1 survey form**

March 16, 1989

To:

From: John Ross
OISE Trent Valley Centre

Re: Thinking Skills Project

We missed hearing from you!

If you were working on decision making skills with your students in the month of February, please fill out the "Week 1 Activity Form" that we sent you earlier. An extra copy is enclosed if you need it.

If you did not teach decision making in February, it is not too late to start now. [When you have completed the activities that you planned for the first week of your schedule], please fill out the attached form and send it in the attached envelope to us, care of Carl Ritchey at Hopkins Road.

We look forward to learning about your experiences in the classroom.

**This letter is to go out to the librarians when they have sent in the February survey form**

March 16, 1989

To:

From: John Ross
OISE Trent Valley Centre

Re: Thinking Skills Project

Thank you for sending us information about your experiences in February helping grade 5 teachers improve children's decision making skills. We really appreciate the way you are keeping us informed about your activities.

Enclosed you will find a similar form that will make it easy for you to tell us about your experiences and your feelings about helping teachers with decision making instruction in March. When your teachers have completed their second weeks of teaching decision making, or at the end of March if they haven't finished by then, please take a few minutes to fill in the form and send it in the enclosed envelope to us, care of Carl Ritchey at Hopkins Road.

You might notice that your SECRET code number is on this form. We will use this code number to keep track of all the information that you have given us. Only you and OISE will have this number, and when we have entered the information into the computer, we will destroy our record of the code. At the end of this year, you will be the only person who knows the identity of this code number.

Once again, let me thank you for the commitment you have made to improving children's thinking skills.

***APPENDIX B-3f***

**This letter is to go out to teachers when they have sent in the week 1 survey form**

March 16, 1989

To:

From: John Ross
OISE Trent Valley Centre

Re: Thinking Skills Project

Thank you for sending us information about your experiences in the first week of teaching decision making. We really appreciate the way you are keeping us informed about your activities.

Enclosed you will find a similar form that will make it easy for you to tell us about your experiences and your feelings during the second week. When you have completed your second week of teaching decision making, please take a few minutes to fill in the form and send it in the enclosed envelope to us, care of Carl Ritchey at Hopkins Road.

You might notice that your SECRET code number is on this form. We will use this code number to keep track of all the information that you have given us. Only you and OISE will have this number, and when we have entered the information into the computer, we will destroy our record of the code. At the end of this year, you will be the only person who knows the identity of this code number.

Once again, let me thank you for the commitment you have made to improving children's thinking skills.

***APPENDIX B-3g***

The Ontario Institute for Studies in Education
Trent Valley Centre
P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

Teachers

April 6, 1989

To:

From: John Ross
OISE Trent Valley Centre

Re: Thinking Skills Project

Thank you for sending us information about your experiences teaching decision making skills in March. We really appreciate the way you are keeping us informed about your activities.

Enclosed you will find a similar form that will make it easy for you to tell us about your experiences and your feelings about teaching decision making in April, the final month of the project. Please take a few minutes to fill in the form and send it, with the completed posttests, in the enclosed envelope to us, care of Carl Ritchey at Hopkins Road.

Also enclosed are test forms and test directions for the posttest to be administered after you have finished teaching decision making.

Once again, let me thank you for the commitment you have made to improving children's thinking skills.

Affiliated with the University of Toronto

***APPENDIX B-3h***

The Ontario Institute for Studies in Education
Trent Valley Centre

Teacher - Librarians

P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

April 6, 1989

To:

From: John Ross
OISE Trent Valley Centre

Re: Thinking Skills Project

Thank you for sending us information about your experiences in March helping grade 5 teachers improve children's decision making skills. We really appreciate the way you are keeping us informed about your activities.

Enclosed you will find a similar form that will make it easy for you to tell us about your experiences and your feelings about helping teachers with decision making instruction in April. When your teachers have completed their third week of teaching decision making, or at the end of April if they haven't finished by then, please take a few minutes to fill in the form and send it in the enclosed envelope to us, care of Carl Ritchey at Hopkins Road.

Once again, let me thank you for the commitment you have made to improving children's thinking skills.

John

***APPENDIX B-3i***

The Ontario Institute for Studies in Education
Trent Valley Centre

P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

1989 06 08

Dear

Thank you for being so cooperative in the interview at the school. The information you gave us is extremely helpful.

We are now in the final steps of the project and according to our records we are missing some information that will help us understand your work this year. The check marks show what we have--the blanks indicate what we hope you will send us.

.interview ________
.pretest ________
.posttest ________
.teacher style ________

.activity week 1 ________
week 2 ________
week 3 ________
.principal style ________
.school characteristics ________

If you have not already done so, please administer the posttest by **JUNE 14**. If you haven't finished your teaching plan by then, write this at the top of your student record form and we will take it into account. If you are missing any forms, let us know and we'll send another copy.

Once again let me remind you that all the information you give us will be kept strictly confidential. Send materials in the envelopes sent to you earlier to Carl Ritchey, Consultants Office, Durham Board of Education, 1400 Hopkins Street, Whitby, Ontario, L1N 2C3. These will be sent to our office **UNOPENED**.

Sincerely,

Pat MacMullen

Affiliated with the University of Toronto

***APPENDIX B-3j***

The Ontario Institute for Studies in Education
Trent Valley Centre

P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

June 20, 1989

Thank you for your participation in the Thinking Skills Project. We are sorry to have missed you the day we visited your school. As a result we have an incomplete data file for your class. Enclosed is everything you need to complete your file.

Last year, during the project, teachers told us that to better understand the student results we had to understand what was going on in both the classroom and the school. The two survey instruments are designed to give us a clear picture of your school.

Please be assured that all the information you give us will be kept strictly confidential. The items can be mailed to Carl Ritchey at the Board Office in the envelopes provided. These will then be sent to our office unopened.

We realize that this is a busy time of your for you and we are very appreciative of your continued cooperation.

Sincerely yours,

Patricia MacMullen & Nicola Sutcliffe

# Procedure for Site Visits

## Arranging the Visit

1. Telephone the principal.
2. Send individual letters to teachers and librarian.
3. If required, phone principal the day before

## Preparing for the Visit

1. Collect and review the school file.
2. Complete the data checklist and identify missing items.
3. Make sure tape recorder works and tapes are ready.

## During the Visit

1. On arrival, go to the office to find out where the interviews will be held (or if the place is known, to record your presence in the school).
2. Interview the principal and librarian.
    - collect librarian activity forms
    - conduct interview
    - leave copies of Climate Survey and Principal Style Survey to be mailed in one week (ideally to be picked up by the researcher before leaving the school)
3. Interview the grade 5 teachers.
    - collect post tests; if necessary allow additional week for their administration
    - collect activity forms
    - leave copies of Climate Survey and Principal Style Survey to be mailed in one week
4. Review and ammend notes taken during the interviews

## After the Visit

1. After 10 days, check school file for completeness.
2. Begin attempts to obtain missing data.

## First Telephone Contact with Principals

1. Purpose of Call: I am calling on behalf of the thinking skills project being conducted by a joint committee of Durham Region and OISE staff. As indicated in previous correspondence, we are planning to visit schools to get a better understanding of the project has been going.

2. Date & Time: We would like to visit your school on ____, in the ____.

3. Procedure: During the visit we would like to interview you, [librarian], [grade 5 teachers]. These interviews will be held with each individual separately and what people say will be kept strictly confidential. We are planning to tape record the interviews as a back up to the notes that we will make during the interview—unless tape recording makes people feel uncomfortable. (Note: If anyone feels uncomfortable the tape recorder will be turned off.)

4. Covering Off: The best arrangement would be to hold the interviews during school time. The interviews with you and the librarian might be fairly easy to schedule but the grade 5 teacher interviews might be more difficult to arrange. Do you think it would be possible to have their classes covered? (Note: If this is a problem, suggest that the interviews be held after school or at lunch.)

5. Further Communication: We will send a letter this week to each teacher and librarian describing what will happen in the interview, and a day or two before the interview we'll telephone to check to see that everything is still OK. I look forward to talking to you then.

[Note: Participation is voluntary. If anybody declines to participate we have to accept their decision.]

## Rationale For Our Extensive Data Collection Requirements

- Last year some teachers voiced concerns about us trying to interpret student achievement data without knowing anything about the school, the staff, or how they went about teaching skills. This year we are attempting to respond to those concerns.
- Student outcomes, we believe are significantly influenced by teachers' actions in setting objectives, planning, delivery, reflection and evaluation. We need to know what teachers did.
- Teachers actions are influenced by collaboration with peers. We need to know about the nature and extent of that collaboration.
- Teachers actions and collaboration can be influenced by the principal. We need to know about the principals role and about their leadership style.
- All of these actions take place in the context of the school and schools vary considerably. We need to know about the unique characteristics of the school.
- Teaching is a process not an event.
- Board (and OISE) committing considerable resources for Thinking Skills inservice. Teachers can attend during in school time. Need to be accountable to board.
- Some teachers may find teaching think skills difficult to incorporate into their current practices. We need to know how to help them for next year.

The Ontario Institute for Studies in Education
Trent Valley Centre

P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

Dear Principal

Thank you for responding to our request to visit your school on the ____________ of ________________ . This letter will clarify some of the details of our visit.

Our purpose is to get a sense of your school's context and of what has happened in your school over the course of the year following the workshops on "Teaching Thinking Skills". We would like to do this by interviewing yourself and members of your staff that have been involved in the project this year (i.e., teacher-librarian and grade 5 teachers).

The interviews will be conducted on an individual basis and all information will be kept strictly confidential. The interviews will each last approximately 30-40 minutes. We would like to "back up" our interview notes by tape recording the interviews, unless this would make anyone feel uncomfortable.

Our goal is to be as unobtrusive as possible during our visit. We sincerely hope that interviews with all concerned can be arranged within the half day that we have scheduled. Please contact us if you require further information. We look forward to meeting with you and your staff.

Sincerely,

JB Cousins

Brad Cousins
Assistant Professor

***APPENDIX B-4-d2***

The Ontario Institute for Studies in Education
Trent Valley Centre

P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

Dear Librarian

Having conferred with your principal, we plan to visit your school on the ____________ of ________________ concerning the "Teaching Thinking Skills" project. This letter will clarify some of the details of our visit.

Our purpose is to get a sense of how things went in the project in your school this year. We would like to do this by interviewing you, your principal and grade 5 teachers that have been involved in the project this year.

The interviews will be conducted on an individual basis and all information will be kept strictly confidential. The interviews will each last approximately 30-40 minutes. We would like to "back up" our interview notes by tape recording the interviews, unless this would make anyone feel uncomfortable.

We hope that the teacher(s) in your school will be (have been) able to complete "Week 3" of their schedules for teaching thinking skills and that it is possible for you to have completed the "Week 3" activity form by the time of our visit. We would very much like to pick it up when we see you (if you have not already sent it to [redacted]). We look forward to meeting with you and your colleagues.

Sincerely,

Brad Cousins
Assistant Professor

Affiliated with the University of Toronto

***APPENDIX B-4-d3***

The Ontario Institute for Studies in Education
Trent Valley Centre

P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

Dear Teachers

Having conferred with your principal, we plan to visit your school on the ____________ of ________________ concerning the "Teaching Thinking Skills" project. This letter will clarify some of the details of our visit.

Our purpose is to get a sense of how things went in the project in your school this year. We would like to interview you, your principal, your teacher-librarian and any other grade 5 teachers that have been involved in the project this year.

The interviews will be conducted on an individual basis and all information will be kept strictly confidential. The interviews will each last approximately 30-40 minutes. We would like to "back up" our interview notes by tape recording the interviews, unless this would make anyone feel uncomfortable.

Enclosed, please find copies of post-test forms and directions for administration, a "Week 3" activity record form, and a record of student performance for your class on the pretest. (The pretest results, like the other information you are giving us, will be kept confidential). Would it be possible for you to administer the post-test and fill out the activity forms by the time of our visit? We would very much like to pick them up when we see you. We look forward to meeting with you and your colleagues.

Sincerely,

JB Cousins

Brad Cousins
Assistant Professor

***APPENDIX B-4-d4***

The Ontario Institute for Studies in Education
Trent Valley Centre
P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

Dear Teacher

Having conferred with your principal, we plan to visit your school on the __________ of ______________ concerning the "Teaching Thinking Skills" project. This letter will clarify some of the details of our visit.

Our purpose is to get a sense of how things went in the project in your school this year. We would like to do this by interviewing you, your principal and grade 5 teachers that have been involved in the project this year.

The interviews will be conducted on an individual basis and all information will be kept strictly confidential. The interviews will each last approximately 30-40 minutes. We would like to "back up" our interview notes by tape recording the interviews, unless this would make anyone feel uncomfortable.

We hope that the teacher(s) in your school have been able to complete "Week 3" of their schedules for teaching thinking skills by the time of our visit. Enclosed, please find a "Week 3" activity form for you to complete. We will pick it up on the day of our visit. We look forward to meeting with you and your colleagues.

Sincerely,

Brad Cousins
Assistant Professor

Affiliated with the University of Toronto

***APPENDIX B-4-d5***

The Ontario Institute for Studies in Education
Trent Valley Centre

P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

Dear Teacher

Having conferred with your principal, we plan to visit your school on the ____________ of ________________ concerning the "Teaching Thinking Skills" project. This letter will clarify some of the details of our visit.

Our purpose is to get a sense of how things went in the project in your school this year. We would like to interview you, your principal, your teacher-librarian and any other grade 5 teachers that have been involved in the project this year.

The interviews will be conducted on an individual basis and all information will be kept strictly confidential. The interviews will each last approximately 30-40 minutes. We would like to "back up" our interview notes by tape recording the interviews, unless this would make anyone feel uncomfortable.

Enclosed, please find a record of student performance for your class on the pretest. (The pretest results, like the other information you are giving us, will be kept confidential). Would it be possible for you to administer the post-test and fill out the activity form by the time of our visit? We would very much like to pick them up when we see you (if you have not already forwarded this information to [redacted]). We look forward to meeting with you and your colleagues.

Sincerely,

Brad Cousins
Assistant Professor

Affiliated with the University of Toronto

The Ontario Institute for Studies in Education
Trent Valley Centre

P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

Dear Teacher

Having conferred with your principal, we plan to visit your school on the ____________ of ________________ concerning the "Teaching Thinking Skills" project. This letter will clarify some of the details of our visit.

Our purpose is to get a sense of how things went in the project in your school this year. We would like to interview you, your principal, your teacher-librarian and any other grade 5 teachers that have been involved in the project this year.

The interviews will be conducted on an individual basis and all information will be kept strictly confidential. The interviews will each last approximately 30-40 minutes. We would like to "back up" our interview notes by tape recording the interviews, unless this would make anyone feel uncomfortable.

Enclosed, please find copies of post-test forms and directions for administration, a "Week 3" activity record form, and a record of student performance for your class on the pretest. (The pretest results, like the other information you are giving us, will be kept confidential). Would it be possible for you to administer the post-test and fill out the activity forms by the time of our visit? We would very much like to pick them up when we see you. We look forward to meeting with you and your colleagues.

Sincerely,

Brad Cousins
Assistant Professor

The Ontario Institute for Studies in Education
Trent Valley Centre

P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

Dear Teacher

Having conferred with your principal, we plan to visit your school on the ____________ of ______________ concerning the "Teaching Thinking Skills" project. This letter will clarify some of the details of our visit.

Our purpose is to get a sense of how things went in the project in your school this year. We would like to interview you, your principal, your teacher-librarian and any other grade 5 teachers that have been involved in the project this year.

The interviews will be conducted on an individual basis and all information will be kept strictly confidential. The interviews will each last approximately 30-40 minutes. We would like to "back up" our interview notes by tape recording the interviews, unless this would make anyone feel uncomfortable.

Enclosed, please find copies of post-test forms and directions for administration, a "Week 3" activity record form, and a record of which students received which pretest form (A or B). (Thank you for submitting your pretest information. The results will be scored soon and forwarded to you). Would it be possible for you to administer the post-test and fill out the activity form by the time of our visit? We would very much like to pick them up when we see you. We look forward to meeting with you and your colleagues.

Sincerely,

Brad Cousins
Assistant Professor

*****APPENDIX B-5a*****

The Ontario Institute for Studies in Education
Trent Valley Centre

P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

**Memorandum**

To: [redacted]

From: Brad Cousins, Assistant Professor
OISE Trent Valley Centre and Centre for Principal Development

Date: November 3, 1988

Re: Curriculum Leadership Focus Group Participation

---

Yes! You have been selected at random to join a focus group of your colleagues! The focus will be on developing personal strategies for fostering teacher-teacher communication about teaching thinking skills in your school. Your participation is not mandatory, but we hope that you will give serious consideration to our offer. Serious consideration might take the form of coming to our first workshop at 3:15-4:15 p.m., Tuesday, November 29, 1988, [redacted] (We have deliberately scheduled this meeting immediately prior, and geographically close, to your 5:00 p.m. dinner meeting at [redacted] to try to accommodate your busy schedule -- thanks to [redacted] for agreeing to hold the meeting at [redacted]).

WHAT'S THE OFFER? We've been making a lot of noise about the benefits of teacher-teacher interaction on student outcomes and how the principal can have a significant role in enhancing that. Now, with your help, we want to prove it! We want to prove it by working with you to develop and implement a personal plan of action that fits closely with your own school, your own style of leadership, your own staff and your own busy schedule.

WHAT'S IN IT FOR YOU? Principals that I have come to know through my work with the Centre for Principal Development express a good deal of frustration about being overextended and swamped with "one thing after another". But they are also under considerable pressure to demonstrate that they can do more than just run the school and keep everybody happy -- they are under pressure to demonstrate that they are effective curriculum leaders. But how do you go about doing that? [redacted] initiatives (e.g., Partners in Action and Curriculum Toolkit), in my view, are in the forefront in trying to foster curriculum leadership. The project we are proposing is entirely consistent with these initiatives. This is an opportunity for you to systematically reflect on and further develop your own curriculum leadership skills.

WHAT'S IN IT FOR US? We want to collect information about the effects on teachers and students of implementing these action plans. By reviewing research and examining practical issues we want to help refine the personal plans so that they work even better in your school. We want to report how much of an impact the group had on developing childrens' thinking skills.

**WHAT'S IT GOING TO COST YOU?** In terms of **your school's resources**: zip. In terms of **your out-of-school time**: not too much. In addition to the one hour meeting on November 29, a follow-up meeting is scheduled at **10:15-11:45 a.m., Tuesday, January 10, 1988,** [redacted] -- immediately following the general principals meeting about teaching decision making. Beyond that, I foresee the need to meet twice more for say 2.5 hours each, perhaps once in February and again in April or early May. That adds up to about 8.5 hours (including the general principals' meeting). In terms of **your in-school time**: that's up to you. Each personal action plan will be different and sensitive to the unique characteristics of your own local situation. You may design a plan that requires a significant amount of time or not much at all. The important thing to remember is that this time should be well spent because it's consistent with current curriculum initiatives in [redacted]-- it's not "add-on" time.

**WHO'S GOING TO COLLECT ALL THE INFORMATION?** We are. Well, that's not quite true because you might design an action plan that involves monitoring of some sort. But as far as information about the effects of the group's efforts goes, our staff will have full responsibility for collecting, analyzing and summarizing.

**WILL THE SUCCESS OF YOUR SCHOOL BE COMPARED WITH OTHERS?** No. This project is not an evaluation. All of the information will be pooled, and the effect of the group as a whole will be examined. If you wish to know how your school stacks up against the group as a whole we can arrange to get that information to you. Otherwise the information will remain, in confidence, at the Trent Valley Centre.

**ONCE YOU'RE IN, CAN YOU BAIL OUT?** Sure. All we're asking is that you give it a try. If it's just not working out for you then by all means you have the right to withdraw. However, we hope you'll at least come out to the November 29 meeting before you pull the ripcord.

We're really convinced that teacher-teacher communication about what goes on in the classroom can have very positive effects on pupils. Swamped, and busy as you are, we are also convinced that you can make a difference by enhancing that communication. Hope to see you on the 29th.

Cheers, Brad.

***APPENDIX B-5b***

The Ontario Institute for Studies in Education
Trent Valley Centre

P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

**Memorandum**

To: Principals of Schools Involved in the Teaching Thinking Skills Project

From: Brad Cousins, Assistant Professor
OISE Trent Valley Centre and Centre for Principal Development

Date: November 3, 1988

Re: Upcoming Workshop

---

We appreciate your support for the "Teaching Thinking Skills" professional development project. As you know, we have extended the project this year to include grade 5 teachers and to provide special sessions exclusively for principals.

If you were able to attend the session on October 21 you will recall that communication among teachers about teaching thinking skills was identified as a potentially powerful influence on classroom implementation and that principals can be the key to enhancing this kind of interaction among staff. Suggested strategies to help principals do this included:

- showing explicit support and commitment to teaching thinking skills;
- providing access to resources for staff;
- setting priorities and promoting a shared vision of ideal student outcomes attributable to teaching thinking skills;
- providing opportunites for staff to interact with one another about their classroom practice;
- monitoring interaction about teaching thinking skills;
- participating directly in teaching thinking skills in the classroom.

Or course, every school is unique and the effectiveness of selected strategies will depend largely on the local setting.

You are cordially invited to a second workshop exclusivly for principals at 9:00-10:00 a.m., **Tuesday, January 10, 1989**, [redacted]. The session will provide you with information about teaching decision making, the focus for the next grade 5 teacher workshop (to be held on Jan. 12). Student growth, teaching and assessment practices for teaching decision making will be covered and there will be continued emphasis on the principals' role.

Because we believe that this project is so closely linked with [redacted] initiatives of Partners in Action and curriculum leadership we have decided to work closely with a group of willing principals to develop strategies in promoting teacher communication about teaching thinking skills. If you find a letter attached to this memo you have been randomly selected to consider participation in that focus group. The letter will provide you with further information. If not, the workshop on the 10th will be the last in our series for this year -- hope to see you there! And thank you, again, for your support.

Cheers, Brad.

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***APPENDIX B-5c***

The Ontario Institute for Studies in Education
Trent Valley Centre

P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

**Memorandum**

To: Principals Unable to Attend Nov. 29 Focus Group Meeting

From: Brad Cousins, Assistant Professor
OISE Trent Valley Centre

Date: November 28, 1988

Re: Focus Group Participation

---

We are sorry that you were unable to attend with colleagues the meeting to discuss focus group participation at [redacted], Novemeber 29. During that meeting we discussed the rationale for the project and expectations principals that decide to participate should have. Enclosed you will find a memo requesting you to identify your level of commitment to the project. Please feel free to contact me at (705) 742-8827 if you require further information. Otherwise please complete and return that memo to me.

Also enclosed, please find a task for you to complete prior to our next meating January 10. Note that this information is relevant only to those of you who decide to particpate.

Cheers, Brad.

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***APPENDIX B-5d***

The Ontario Institute for Studies in Education
Trent Valley Centre

P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

**Memorandum**

**To:** Potential Curriculum Leadership Focus Group Principals

**From:** Brad Cousins, Assistant Professor
OISE Trent Valley Centre

**Date:** November 28, 1988

**Re:** Focus Group Participation

---

You have now had an opportuninty to learn about and give consideration to the possibility of joining with colleagues a focus group directed at improving teacher-teacher interaction among your junior division teachers concerning teaching thinking skills. Your out-of-school involvement if you participate will be 6.5 hours consisting of a 1.5 hour meeting in January and a 2.5 hour meeting in each of February and April. Your in-school commitment will be reflected in the action plan that you develop for your own school. Some information collection will take place in May but this will be done by research staff from OISE.

Given your current knowledge about the project please indicate your commitment by checking one of the following

☐ I wish to participate and recognize that although some commitment of time on my behalf is required I am free to withdraw from the project at any time. I also realize that any information collected in my school will reamain confidential and only members of the immediate research team at OISE will have access to individual responses.

signature ______________________________

☐ I need more information before I decide to participate. Brad, please call me at ______________________.

☐ I do not wish to partcipate in this project. (It would be useful to us if you took a minute to explain in the space below, why you feel that you cannot participate in this project).

Name/School (please print) ____________________/____________________

Thank you for your attention to this matter. We would appreciate it if you would return this document in the envelope provided by Monday, December 5, 1988.

Cheers, Brad. /BC

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***APPENDIX B-5e***

**MEMORANDUM**

**TO:** Principals Unable to Attend Jan. 10 Workshop on Teaching Thinking Skills

**FROM:** Brad Cousins

**DATE:** Jan. 12, 1989

**RE:** Workshop Update

---

We are sorry that you were unable to attend the Thinking Skills workshop on Tuesday (10th) with your colleagues. We provided an overview of the Teaching Decision Making instructional materials and procedures. The agenda included information about expectations for growth in student performance, how to teach decision making, assessment of student performance and the information collection needs for the Teaching Thinking Skills Project. Please find enclosed the resource package distributed at the workshop.

Today we held the workshop for the grade 5 teachers and teacher librarians and disseminated to them the same materials. We were very pleased with the turnout and level of enthusiasm shown by these folks. In addition to covering the material they participated in developing curricula for teaching decision making. You may wish to consult your staff if you require clarification on any of the attached information or feel free to contact myself or John Ross.

Best Wishes in '89'

Brad

***APPENDIX B-5f***

The Ontario Institute for Studies in Education
Trent Valley Centre

P.O. Box 719, 150 O'Carroll Avenue, Peterborough, Ontario
K9J 7A1 Tel. (705) 742-8827

**MEMORANDUM**

TO: Focus Group Principals

FROM: Brad Cousins JBC.

DATE: January 16, 1989

RE: Profile Development Update

---

Subsequent to our meeting on Jan. 10, John Ross and I went over the information generated by the group and gave serious consideration to developing a preliminary version of the profile. In the interest of clarity, we thought it might be prudent to develop a profile of classroom actions according to the dimensions identified in our meeting (see Exhibit A). This, we believe, may be a useful aid for people to think about teaching decision making. We then proceeded to develop the teacher-teacher interaction profile based on the information discussed by the group and a little further brainstorming (see Exhibit B). This profile, of course, is the one that is relevant to the development of your individual school action plans.

In our next meeting on Jan. 30 we will revise the profile according to your input and then proceed to develop individual school action plans. Specifically, we will:

1. Critically review the teacher-teacher interaction profile. Do the dimensions (columns) make sense? Are there any missing dimensions? Within dimensions do the levels (rows) make sense? Are these manageable steps for staffs to take? Are there steps missing? Are you able to plot your own staff on the profile?
2. Think about obstacles that might stand in the way of moving staffs from one step to the next within dimensions. Some obstacles were mentioned in the meeting and I have recorded these and tried to generate additional ones (see Exhibit C).
3. Think about strategies principals might use in order to overcome the identified obstacles.
4. Develop individual school plans that should pay particular attention to the identification of obstacles and strategies in addition to the specification of current (actual) and projected (desired) staff interaction.

Next Meeting: Mon. January 30, 1:00 p.m., [redacted]

Final Meeting: Tues. April 4, 1:00 p.m., [redacted]

Please forward regrets to Brad. Cheers.

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**MEMORANDUM**

**TO:** Focus Group Principals

**FROM:** Brad Cousins

**DATE:** February 1, 1989

**RE:** Notes from January 30 Meeting

---

The meeting began with a quick review of the "Instructional Quality Profile". Principals will recall that the purpose of this profile is to provide them (and their staff) with a sense of what individual teacher growth in teaching thinking skills might look like. Modest changes were made to this profile based on the group's input (see Exhibit A for updated version).

The bulk of the meeting was devoted to the revision of the "Teacher-Teacher Interaction Profile" upon which school action plans will be based. It should be noted that this profile pertains to growth in staff tendencies to collaborate with one another. A preliminary draft of the profile was constructed by Brad based on a synthesis of input from the January 10 Principal's Meeting and on a brainstorming session with John Ross. The preliminary draft was modified substantially by the group (see Exhibit B for updated version). Some of the main changes were:

- "teachers" now refers to both teachers and teacher-librarians (see footnote in Exhibit B)
- additional levels were added within some of the dimensions (columns) of the profile;
- the wording of some of the levels were made more clear;
- some levels were removed due to a lack of correspondence with the dimension.

Other changes that seemed sensible based on input at the meeting were:

- inverting the columns so that "optimal" levels are at the top;
- providing a clear indication of direction toward optimal levels (scale in left side margin);
- making each column the same length regardless of the number of levels within dimensions. Since it is easier to make progress in some areas than in others, the dimensions should be thought of as reasonably independent -- level 2 on one dimension might be reached at the same time as level

4 or 5 on another in the same school. Dimensions need not have the same number of levels.

The meeting ended with a quick discussion of obstacles that might prevent a staff from moving up the profile. The preliminary list provided was reviewed and revised slightly. This list will be helpful in formulating individual school plans (Exhibit D & E).

It was agreed that upon receipt of the revised information, group members would quickly proceed to formulate action plans and submit copies to Brad. Attached are instructions for constructing "standard" action plans. Of course, you are free to use your own format if you so desire. Please try to construct your plan, and submit the copy to Brad A.S.A.P., for example, by February 15.

When you have developed your plan implementation can get underway whenever it is convenient for you and your staff. At our meeting in April we will talk informally about how the implementation is going, what kinds of problems have emerged, what strategies seem to be working, and so on. That will be our last meeting as a group for the project. Site visits by myself and staff from the Tent Valley Centre will occur in May. The purpose of these visits will be to talk with you and your staff individually in order to get a good sense of how things worked out. If your want to talk about progress before then, feel free to call me at 705-742-8827.

Finally, some folks at the meeting expressed an interest in developing their own rationales about why teaching thinking skills is such a wonderful thing to do. Attached (Exhibit F) is a brief addressing this very issue. If you want further information (e.g., John Ross' book on Teaching Problem-Solving, research reports [journal articles] on teaching thinking skills) give me a call.

See you in April, Brad

**Next Meeting, Tuesday April 4, 1:00 p.m., [redacted]**

**Social Hour to follow!**

encl.
Exhibit A - Instructional Quality Profile
Exhibit B - Teacher-Teacher Interaction Profile
Exhibit C - List of Obstacles
Exhibit D - Instructions for Developing School Plans
Exhibit E - Planning Sheets
Exhibit F - Thinking Skills as a School Priority

The Ontario Institute for Studies in Education
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***APPENDIX B-5h***

**MEMORANDUM**

TO: All Principals of Schools Participating in the Teaching Thinking Skills Project

FROM: Brad Cousins BC
John Ross

DATE: March 6, 1989

RE: General Progress

---

We are pleased to report that the Teaching Thinking Skills Project is progressing even better than we expected. This year we tried to be more sensitive to the needs of teachers and teacher librarians and it looks like our efforts are paying off with a high rate of participation. Another important reason is the active learning component of the thinking skills materials and the teachers appreciate this. There are still a few teachers and teacher-librarians we have not heard from. (Are any of these in your school?)

We have now started to collect second round information from your staff (activity survey). We would appreciate your efforts to encourage teachers to implement their plans for improving children's decision making skills. It is also very important that teachers and teacher-librarians continue sending in the information and, when they do, to make sure they put their name on the forms. This information is crucial for our data processing purposes and, of course, will remain confidential.

In April we will begin the third and final round of information collection (post-tests, activity surveys). This will be followed by visits by a team from OISE to a number of volunteer schools. The purpose of the visits will be to give us a sense of what has transpired in the schools throughout the year. We anticipate conducting private interviews over lunch (on us) or over coffee and muffins after school with principals and staff involved in the project. There will be no classroom observation. We will be in touch soon if your school is selected to be asked to volunteer.

We thank you for your role in supporting the project and encouraging staff to participate. The information we collect is very valuable to us not only in meeting [redacted] accountability needs but also in improving our own inservice efforts. We look forward to visiting you in your school and/or your continuing involvement in the Teaching Thinking Skills Project next year.

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***APPENDIX B-5i***

**MEMORANDUM**

TO: Focus Group Principals
Teaching Thinking Skills Project

FROM: Brad Cousins JBC

DATE: March 10, 1989

RE: Re-scheduled Meeting

---

Our meeting originally scheduled for April 4th has been rescheduled for Monday, April 10, 1:00-3:30, [redacted], [redacted]. [redacted] [redacted] and I attempted to accommodate as many of your schedules as possible in selecting this date.

The agenda for the meeting will be:

1. General progress of the project. [Brad, Murray]
2. Discussion of implementation of action plans -- obstacles, effectiveness of strategies, Profile revision, etc. [Group]
3. Information collection plans. [Brad]
4. Other business.
5. [Social Hour to follow meeting].

We hope that your year is progressing satisfactorily and, of course, that your staff is enjoying teaching thinking skills. Feel free to call if you have any comments, questions or concerns -- particularly with regard to your school action plan.

See you soon.

# Task 1

Your task for our next meeting in January is to give consideration to the following types of teacher-teacher interaction and to decide which are relevant for your own school context; that is, which of the following are practiced or have taken place with your junior division (J.D.) teachers. Having done that we would like you to respond to a series of questions in preparation for our next meeting.

## Teacher-Teacher Interaction

### Observation

- Evaluative Observation: Your J.D. teachers have been observed in practice and their performance has been appraised by you, a superintendent or some other administrator.

- Expert/novice coaching: your J.D. teachers have been involved in a coaching system that is unidirectional. That is, a given teacher has been oberved in practice or has observed another in practice but not vica versa.

- Peer coaching: Your J.D. teachers have been involved in a coaching scheme where two or more teachers alternate observing and being observed in practice.

### Collaboration

- Your J.D. teachers have participated in a "study group" or "focus group" for the purposes for planning lessons, developing assessment techniques, etc.

- Your J.D. teachers have participated on an in-school curriculum development team.

- Your J.D. teachers have participated on an out-of-school curriculum development team.

- Your J.D. teachers have shared planning and development activities with one or two colleagues.

## Dissemination

- Your J.D. teachers have developed and delivered inservice (including presentation of theory, modeling or demonstration, practice under simulated circumstances, etc.) to coleagues in your own school.

- Your J.D. teachers have developed and delivered inservice (including presentation of theory, modeling or demonstration, practice under simulated circumstances, etc.) to colleagues outside of your school.

## Communication

- Your J.D. teachers engage with colleagues in informal discussion/feedback sessions about their in-classroom practices.

- Your J.D. teachers report to colleagues about classroom practices in more formal situations (e.g., staff meetings).

These are but a few examples of the kinds of teacher-teacher interactions that may or may not be taking place in your school with your junior division teachers. Undoubtedly there are others that are not listed -- you should make a note of these if any come to mind.

Given the above list of types of teacher-teacher interaction (TTI) and your knowledge of the kinds of activities involved in teaching thinking skills, answer the following questions.

1. Which types of TTI if changed, do you believe would have the greatest positve impact on students learning thinking skills?

2. Describe what this type of TTI would be like if it was to have the greastest possible positive impact on students learning thinking skills.

3. Assuming that the type of interaction that you have described was not happening what are some managable steps to be taken that would move a staff closer to the ideal level you have described? Number the steps.

4. Where are your own J.D. teachers on this type of TTI now (e.g., step number ...)?

5. What obstacles might prevent your J.D. teachers from moving to higher steps?

Please attempt to have completed this task for the next meeting. At that time we will look at possible strategies to overcome obstacles and to the development of individual action plans.

Finally, think about and describe (1) a very favorable colleagial relationship among teachers in your school and (2) a very poor colleagial relationship among teachers in your school. What are the salient features of each relationship?

***APPENDIX B-6b***

# EXHIBIT A

# TEACHING THINKING SKILLS PROJECT

# INSTRUCTIONAL QUALITY PROFILE

| | OBJECTIVE SETTING | PLANNING | DELIVERY | STUDENT EVALUATION |
|---|---|---|---|---|
| Optimal ↑ | average student at Level 4 (summarizing strategy) | demonstration (Level 4) with practice, with quiz | adjustment (formal or informal) to needs of upper and lower students | explicit indicators for multiple observations (students, self-evaluation, criteria developed together) |
| | average student at Level 3 (explicit attention to advantages and disadvantages) | demonstration (Level 4) with practice | adjustment (formal or informal) to needs for either upper or lower students | explicit indicators single measure |
| | average student below Level 3 | limited demonstration and practice (e.g., advantages & disadvantages) | | implicit indicators |
| | "improve" thinking skills | | no adjustment | pupil satisfaction |
| Low | focus on content | no explicit teaching of decision making | failure to implement | no indicators |

***APPENDIX B-6c***

EXHIBIT B

## TEACHING THINKING SKILLS PROJECT

## TEACHER-TEACHER INTERACTION PROFILE *

| | OBJECTIVE SETTING | PLANNING | DELIVERY | FEEDBACK TO TEACHER | STUDENT EVALUATION |
|---|---|---|---|---|---|
| Optimal ↑ | joint decision by all teachers involved with grade 5 instruction to pursue same objectives | joint construction of plans by all teachers involved with grade 5 instruction | mobile teacher(s) and combined activity centres | peer coaching (observation and feedback involving all teachers involved with grade 5 instruction) | team marking by teachers |
| | joint decision by two teachers to pursue same objectives | joint construction of plans by two teachers | mobile teacher(s) or combined activity centres | peer coaching (observation and feedback involving two teachers) | agreement on marking scheme by teachers |
| | partial agreement with other teacher(s) on objectives | | | | |
| | inform other teacher(s) of different objectives | division of labour | exchanging materials | formal discussion of observations | |
| | | | | informal discussion of shared anecdotes | |
| | individual objective setting and informing of teacher-librarian | informal sharing of plans | individual delivery making use of outside resources | one-way observation and feedback | sharing marking schemes with teachers |
| | individual objective setting | | | informal relating of shared anecdotes | |
| Low | | individual planning | individual delivery | no feedback | individual marking |

*the term "teacher" is used to denote both teachers and teacher-librarians

# EXHIBIT C

## Teaching Thinking Skills Project

## Obstacles to Teacher-Teacher Interaction

Knowledge

- lack of understanding of decision-making growth scheme
- differential levels of understanding of decision-making growth scheme across staff

Skill

- lack of skill on teaching decision-making
- differential levels of skill on teaching decision-making across staff

Motivation

- teachers not "sold" on teaching decision-making
- teachers comfortable teaching in traditional style
- teachers do not normally interact regarding instruction
- peer pressure not to conform
- teachers lack the time to devote to teaching decision-making

Miscellaneous

- staff room not conducive to substantive interaction about teaching decision-making
- teachers schedules conflict
- teachers unable to find time to interact
- classrooms not near each other

## Exhibit D
## Instructions for Developing School Plans

The task is for each principal to develop a school plan for fostering collegiality among staff in teaching thinking skills. This task should be completed as soon as possible so that you can get on with its implementation. As you know, the project will come to an end in May and that does not leave much time for the plans to have an impact.

The steps involved in formulating a school plan are as follows:

1. Review the revised version of the Teacher-Teacher Interaction Profile (Exhibit B) to make sure you understand the dimensions and levels within each. (Call Brad if ambiguities remain).

2. From the profile, select the dimensions on which you wish to work with your staff. You may select one or all of the dimensions for this purpose -- the more dimensions you select the greater your chances of having an impact in fostering collegiality and improving classroom practice.

3. Fill out only the planning forms (see Exhibit E) corresponding to the dimensions you have chosen. On each form the following information is required.

    a. **Current Status:** Where are your staff on this dimension currently? Select a level from the profile and write it in on the planning sheet.

    b. **Desired Status:** Where would you like to move your staff by the end of April? Again, pick the level from the profile and write it in on the planning sheet. Your goal may be to move up only one level but you can move further up the profile if you wish.

    c. **Possible/Probable Obstacles:** What are the likely obstacles (barriers, hurdles, etc.) to prevent your staff from moving up the profile? Refer to list of obstacles (see Exhibit C) for ideas. You may be able to identify others not listed here. Write in the ones you think are relevant to your own staff on the planning sheet.

    d. **Action:** Given (a) where your staff is currently (b) where you would like your staff to be and (c) possible obstacles the may prevent them from getting there -- What can you do to help? This is the crux of your school plan. Write in what you plan to do to get your staff around (through, over) the obstacles that you have identified. What strategies will you use? The level of detail and specificity is up to you. You may wish to include a timeline, list of indicators of success, etc. The main point is that you know in your own mind what should be done and how to go about doing it.

4. Photocopy the planning sheets that you have completed and send a copy to Brad as soon as possible (please try to do this by about Feb. 15).

## Exhibit E

## PLANNING SHEETS

Select and complete planning sheets only from areas that you plan to work on with your staff. Each sheet corresponds to one dimension (column) in the TTI Profile -- see Exhibit B.

Name: ____________________

School: ____________________

## PLANNING SHEET

Selected Dimension: "Objective Setting"

---

Current Status:

(Level described in
TTI Profile)

---

Desired Status:

(Level described in
TTI Profile)

---

Possible/Probable
Obstacles:
(see Exhibit C or think
of others)

---

Action:
(Your plan or
set of strategies)

Name: ____________________

School: ____________________

## PLANNING SHEET
### Selected Dimension: "Planning"

---

Current Status:

(Level described in
TTI Profile)

---

Desired Status:

(Level described in
TTI Profile)

---

Possible/Probable
Obstacles:
(see Exhibit C or think
of others)

---

Action:
(Your plan or
set of strategies)

Name: ____________________

School: ____________________

## PLANNING SHEET
## Selected Dimension: "Delivery"

---

Current Status:

(Level described in
TTI Profile)

---

Desired Status:

(Level described in
TTI Profile)

---

Possible/Probable
Obstacles:
(see Exhibit C or think
of others)

---

Action:
(Your plan or
set of strategies)

Name: ____________

School: ____________

## PLANNING SHEET
### Selected Dimension: "Feedback to Teacher"

---

Current Status:

(Level described in
TTI Profile)

---

Desired Status:

(Level described in
TTI Profile)

---

Possible/Probable
Obstacles:
(see Exhibit C or think
of others)

---

Action:
(Your plan or
set of strategies)

Name: ____________________

School: ____________________

## PLANNING SHEET
Selected Dimension: "Student Evaluation"

---

Current Status:

(Level described in
TTI Profile)

---

Desired Status:

(Level described in
TTI Profile)

---

Possible/Probable
Obstacles:
(see Exhibit C or think
of others)

---

Action:
(Your plan or
set of strategies)

Exhibit F

# THINKING SKILLS AS A SCHOOL PRIORITY

Why would anyone want to make the improvement of students' thinking skills a school priority? Why would a school want to shift the existing balance between teaching content and teaching skills? Different people give different answers to this question. Several of the more common reasons are listed below. It doesn't really matter which of these rationales are selected; what's important is that teachers and school administrators be clear in their own minds why they are concerned with the improvement of thinking skills.

1) We should be concerned with thinking skills because we are supposed to.

If you look at any Ministry curriculum guideline you will find in the goals and objectives section a prominent list of thinking skills. If you look at all the Ministry guidelines you will find the same set of skills, although the names of the skills may vary depending on the subject and grade level being addressed. Reading all the guidelines shows that thinking skills are not a peripheral but a central intention of the Ministry. For example, when the Ministry issued its revised set of goals for education in 1980 it prefaced the list of goals with a statement indicating that the fundamental purpose of education in Ontario is the development of the "self-motivated self-directed problem-solver".

2) We should be concerned with thinking skills because teachers think they are important.

If you ask teachers, "what is the most important thing students learn in your classroom? What is it that persuades you that they are better off after they have been in your class than they were before?", you will hear a variety of answers. What you will probably not hear is a teacher saying that what is most important is learning some facts about a topic. Rather what you will hear is teachers talking about the contribution of their teaching to the development of the child as a mature responsible adult, one who is able to function effectively in his or her environment and is able to solve problems in everyday life. This emphasis on fundamental social, emotional and intellectual growth speaks to the same image identified in the Ministry guidelines. Both the Ministry and classroom teachers attach similar importance to the development of students' thinking skills.

3) We should be concerned with thinking skills because the curriculum is constantly expanding.

Anyone who has been in education for more than a few years has noticed that every year something new is added to the curriculum. But nothing ever seems to drop away--the curriculum just keeps getting bigger. There is no way any teacher could possibly cover each topic as comprehensively as one would like.

Consequently teachers either cover everything superficially or make careful decisions about how to allocate instructional time.

For teachers who make careful decisions about how to spend class time, two criteria come to mind. First, if time is scarce it makes sense to spend it teaching material that will turn up again. Many of the things we teach students are one shot episodes; we want children to learn these but there aren't any serious consequences if they don't. In contrast, there are objectives which turn up again and again. On these growth is cumulative--each lesson adds something to what has been taught previously and failure to learn has serious consequences down the road. It makes sense for a teacher to spend time teaching thinking skills because they are likely to be required in other grades and subjects.

Second, if class time is limited, it makes sense to spend it on learning that lasts. Everyone knows that students tend to forget what they have been learned. What is not so well known is that the rate of forgetting depends in part on the objective. Forgetting is most rapid and complete for isolated pieces of content. Forgetting is much slower for concepts and skills. It is sensible to spend time teaching thinking skills because students are more likely to retain what they have learned.

4) We should be concerned about thinking skills because some students are leaving school unprepared.

If we measure students' thinking skills we find that some reach very high levels of intellectual performance: these students are able to invent sophisticated strategies for making sense of their world. Others do not. There is a sizable group of students who's intellectual development is truncated, cut off before the levels required to solve important problems in everyday life have been reached. It is possible to teach these lower performing students some of the intellectual strategies invented by the high performers. With a concern for thinking skills it is possible for a school to reduce the numbers of students who leave school unprepared.

## RELATIONSHIP TO OTHER CURRICULUM PRIORITIES

It is anticipated that a school which opts in to the thinking skills project will make it the school's major curriculum priority. The thinking skills project is related to other system curriculum priorities in the following ways:

.it provides another mechanism to support language across the curriculum;

.it provides another way to support multi-level programming to meet a diverse range of student abilities and interests in the same classroom;

.it provides teachers with teaching strategies that are transferable from one content area to another;

.it provides an opportunity for individual principals to develop and reinforce their curriculum leadership skills;

.it provides a framework for a principal to stimulate change in specific subjects and grades.

## Directions for Markers

1. Raters 1 and 2 rate 1/2 of the classes independently, then switch piles and rate the other 1/2 independently. Each rater keeps her own records taking care not to leave marks on student responses.

2. Rater 1 enters the data in one file for each class. Name files PRE.XX where XX=CLASS code number. The data to be entered are as follows:

| Variable | Column | Specifications |
|---|---|---|
| CLASS | 1-2 | Class code number (min 01, max 90) |
| STUDENT | 2-4 | Student code number (min 01, max 35) |
| FORM | 5 | A=1, B=2 |
| SEX | 6 | Female=1, Male=2 |
| AGE | 7-8 | Student age (min 09, max 13) |
| ALT | 9 | Mark for 'alternatives' (min 0, max 1) |
| CRIT | 10 | Mark for 'criteria' (min 0, max 5) |
| SUM | 11 | Mark for 'summary' (min 0, max 1) |

3. Copy each file to a backup disk and store in safe place.

4. Rater 2 verifies each file and changes discrepancies in favour of Rater 2. Note discrepancies between raters on list as they occur (i.e., CLASS XX; STUDENT XX; ALT, CRIT and/or SUM).

5. Meet to resolve discrepancies -- record decision on list.

6. Later, correct data files.

***APPENDIX C-2a***

I.D.: ______________________ PRINCIPAL: ______________________

## DURHAM THINKING SKILLS PROJECT

## CODING FOR PRINCIPAL INTERVIEWS

Staff Involvement:

1. How many staff involved in thinking skills 1 2 3 4 5 6 7 8 9

2. Staff share plans with principal specifically thinking skills 1 2

Problems Encountered teaching decision-making

| | | | yes. | doesn't know | NO |
|---|---|---|---|---|---|
| 3. | Change of Plans | changed plans | 1 | ? | 2 |
| 4. | Object.1 | too hard for kids to learn | 1 | | 2 |
| 5. | Object.2 | too hard for teachers to teach | 1 | | 2 |
| 6. | Object.3 | not worth teaching or learning | 1 | | 2 |
| 7. | Planning.1 | no room in timetable | 1 | | 2 |
| 8. | Planning.2 | conflict with long range plans | 1 | | 2 |
| 9. | Planning.3 | should take place earlier or know earlier<br>conflict with other worthwhile activities | 1 | | 2 |
| 10. | Support.1 | special events,<br>not enough support material | 1 | | 2 |
| 11. | Support.2 | time making up suitable materials<br>too many support materials | 1 | | 2 |
| 12. | Support.3 | materials not well organized | 1 | | 2 |
| 13. | Support.4 | boring for kids | 1 | | 2 |
| 14. | Support.5 | materials above level of kids | 1 | | 2 |
| 15. | Support.6 | too structured (too much paperwork) | 1 | | 2 |
| 16. | Other.1 | split grade inconvenience | 1 | | 2 |
| 17. | Other.2 | time consuming (lots of discussion) | 1 | | 2 |
| 18. | Other.3 | disagrees with wording of tests or tests not relevant to students | 1 | | 2 |
| 19. | Other.4 | Emotional tie to one option- kids bias | 1 | | 2 |
| 20. | Other.5 | did not receive resources | 1 | | 2 |
| 21. | Other.6 | kids do not use it unless instructed | 1 | | 2 |
| 22. | Other.7 | kids not able to concentrate for long periods of time required | 1 | | 2 |

|  |  |  |  |
|---|---|---|---|
| 23. Other.8 | kids give simplistic answers | 1 | 2 |
| 24. Other.9 | deciding the order of things to do | 1 | 2 |
| 25. Other.10 | kids confused over different levels/ processes of decision-making | 1 | 2 |
| 26. Other.11 | library closed for renovations<br>laminator broke down | 1 | 2 |
| 27. Other.12 | teacher shares class- partnered with other teacher-duplicate each others work | 1 | 2 |

## Principals Actions in Thinking Skills Project

|  |  |  |  |  |
|---|---|---|---|---|
| 28. Structure | establish groups, committees | 1 |  | 2 |
| 29. Expectations | set expectations | 1 |  | 2 |
| 30. Time | reduce costs, cover classes, supply teachers | 1 |  | 2 |
| 31. Reward | reward collaboration | 1 |  | 2 |
| 32. Monitor | monitor collaboration | 1 |  | 2 |
| 33. Model | show teachers by doing | 1 |  | 2 |
| 34. Other.1 | organized meeting after workshops. | 1 |  | 2 |
| 35. Other.2 | not involved | 1 |  | 2 |
| 36. Other.3 |  | 1 |  | 2 |
| 37. Withit | 1 =explicit not withit<br>2 = vague<br>3 = withit | 1 | 2 | 3 |
| 38. Receptivity to collaboration |  | 1 |  | 2 |
| 39. support for partners program |  | 1 |  | 2 |

## Levels of Collaboration Among Teachers During Decision-Making Unit

### 40. Objective setting

| | | | | | |
|---|---|---|---|---|---|
| joi[illegible] decision by all te[illegible] involved w[illegible]ade 5 instruction to pursue same objectives | joint decision by two teachers to pursue same objectives | partial agreement with other teacher(s) on objectives | inform other teacher(s) of different objectives | individual objective setting and informing of teacher-librarian | individual objective setting |
| 6 | 5 | 4 | 3 | 2 | 1 |

### 41. Lesson Planning

| | | | | |
|---|---|---|---|---|
| joint construction of plans by all teachers involved with grade 5 instruction | joint construction of plans by two teachers | division of labour | informal sharing of plans | individual planning |
| 5 | 4 | 3 | 2 | 1 |

### 42. Lesson Delivery

| | | | | |
|---|---|---|---|---|
| mobile teacher(s) and c[illegible]ined activity c[illegible] | mobile teacher(s) or combined activity centres | exchanging materials | individual delivery making use of outside resources | individual delivery |
| 5 | 4 | 3 | 2 | 1 |

### 43. Lesson Evaluation

| | | | | | | |
|---|---|---|---|---|---|---|
| xer coaching bservation and edback involving l teachers volved with ade 5 instruction) | peer coaching (observation and feedback involving two teachers) | formal discussion of observations | informal discussion of shared anecdotes | one-way observation and feedback | informal relating of shared anecdotes | no feedback |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 |

### 44. Student Evaluation

| | | | |
|---|---|---|---|
| team marking by teachers | agreement on marking scheme by teachers | sharing marking schemes with teachers | individual marking |
| 4 | 3 | 2 | 1 |

## Obstacles to Teacher-Teacher Collaboration

| | | | Yes | No |
|---|---|---|---|---|
| 45, | Differential levels of understanding of decision-making growth scheme across staff | | 1 | 2 |
| 46. | Diffential levels of skill on teaching decision-making<br>- teachers feeling their way thru since it is first time teaching it. | | 1 | 2 |
| 47. | Teachers not sold on teaching decision-making | | 1 | 2 |
| 48. | Conflict in teaching styles | | 1 | 2 |
| 49. | Teachers do not normally interact regarding instruction<br>Split grade - different foci in instruction. | | 1 | 2 |
| 50. | Peer pressure not to conform | | 1 | 2 |
| 51. | Competing priorities | | 1 | 2 |
| 52. | Interpersonal conflict | | 1 | 2 |
| 53. | Past experience in school (grade 4 experience last year) | | 1 | 2 |
| 54. | No invitation to participate by teacher or teacher-librarian | | 1 | 2 |
| 55. | Expectations not clear (No reason to involve others)<br>T.L. or teacher did not attend workshop. , lack of confidence | | 1 | 2 |
| 56. | No suitable place for substantive interaction | | 1 | 2 |
| 57 | Teachers schedules conflict no coverage<br>* teacher librarian to busy already. | | 1 | 2 |
| 58. | Classrooms not near each other | | 1 | 2 |
| 59. | Absences | | 1 | 2 |
| 60. | Not suitable program | | 1 | 2 |
| 61. | Other.1 | Teacher Librarian works part-time | 1 | 2 |
| 62. | Other.2 | Teacher-Librarian/principal/other teacher not participating in project-no one to work with | 1 | 2 |
| 63. | Other. 3 | Teacher works Part-time | 1 | 2 |
| 64. | Other.4 | Partnering units finished or scheduled for later | 1 | 2 |
| 65. | Other.5 | too time consuming to work with another teacher | 1 | 2 |
| 66. | Other,6 | wants to work within own time frame | 1 | 2 |
| 67. | Other.7 | lack of resources for more than one class to study a subject at one time | 1 | 2 |

| | | | | |
|---|---|---|---|---|
| 68. | Other. 8 | Kids need to be separated & stay with class to eliminate behavioural problems | 1 | 2 |
| 69. | Other.9 | resistance to regular & gifted classes working together | 1 | 2 |
| 70. | Other.10 | new teacher in classroom-didn't start until late | 1 | 2 |
| 71. | Other.11 | have to be organized to work with another teacher | 1 | 2 |
| 72. | Other.12 | Teachers split up at workshop and never got together | 1 | 2 |

General Overview

73. Satisfaction with Student Progress

| Very Satisfied | | | Very Dissatisfied |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

74. Satisfaction with teacher collaboration

| Very Satisfied | | | Very Dissatisfied |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

75. Social Economic Status of Students

| Very High | | Middle Class | | Very Low |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

76. Social Economic Status Variability

| Everbody The Same | | | Everybody Different |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

77. Final Comment

| 1 | 2 | 3 | 4 | |
|---|---|---|---|---|
| negative | neutral | positive | excuse | blank |

***APPENDIX C-2b***

I.D.:____________________ TEACHER:____________________

## DURHAM THINKING SKILLS PROJECT

## CODING FOR TEACHER/TEACHER-LIBRARIAN INTERVIEWS

Problems encountered teaching decision-making

| | | | yes | no |
|---|---|---|---|---|
| 1. | Change of Plans | changed plans | 1 | 2 |
| 2. | Object.1 | too hard for kids to learn | 1 | 2 |
| 3. | Object.2 | too hard for teachers to teach | 1 | 2 |
| 4. | Object.3 | not worth teaching or learning | 1 | 2 |
| 5. | Planning.1 | no room in timetable | 1 | 2 |
| 6. | Planning.2 | conflict with long range plans<br>* should take place earlier or know about earlier | 1 | 2 |
| 7. | Planning.3 | conflict with other worthwhile activities<br>+ special events | 1 | 2 |
| 8. | Support.1 | not enough support material<br>* time making up suitable materials | 1 | 2 |
| 9. | Support.2 | too many support materials | 1 | 2 |
| 10. | Support.3 | materials not well organized | 1 | 2 |
| 11. | Support.4 | boring for kids | 1 | 2 |
| 12. | Support.5 | materials above level of kids | 1 | 2 |
| 13. | Support.6 | too structured (too much paperwork, schedule) | 1 | 2 |
| 14. | Other.1 | split grade inconvenience | 1 | 2 |
| 15. | Other.2 | time consuming (lots of discussion) | 1 | 2 |
| 16. | Other.3 | disagrees with wording of pre-posttests or not relevant to students | 1 | 2 |

16A Emotional tie to one option - biases
16B did not receive resources
16C Kids don't use it unless instructed
16D Kids not able to concentrate for long time periods required.
16E Kids give simplistic answers
16F deciding the order of things to do
16G Kids confused over different levels/processes of decision making
16H library closed for renovations - laminator broke down.
- no problems.

16I teachers share class - partner c̄ other teacher duplicate each others work

## Levels of Collaboration Among Teachers During Decision-Making Unit

### 17. Objective setting

| | | | | | |
|---|---|---|---|---|---|
| [illegible]t decision by all teachers involved with grade 5 instruction to pursue same objectives | joint decision by two teachers to pursue same objectives | partial agreement with other teacher(s) on objectives | inform other teacher(s) of different objectives | individual objective setting and informing of teacher-librarian | individual objective setting |
| 6 | 5 | 4 | 3 | 2 | 1 |

### 18. Lesson Planning

| | | | | |
|---|---|---|---|---|
| joint construction of plans by all teachers involved with grade 5 instruction | joint construction of plans by two teachers | division of labour | informal sharing of plans | individual planning |
| 5 | 4 | 3 | 2 | 1 |

### 19. Lesson Delivery

| | | | | |
|---|---|---|---|---|
| [illegible]bile teacher(s) and [illegible]mbined activity centres | mobile teacher(s) or combined activity centres | exchanging materials | individual delivery making use of outside resources | individual delivery |
| 5 | 4 | 3 | 2 | 1 |

### 20. Lesson Evaluation

| | | | | | | |
|---|---|---|---|---|---|---|
| peer coaching (observation and feedback involving all teachers involved with grade 5 instruction) | peer coaching (observation and feedback involving two teachers) | formal discussion of observations | informal discussion of shared anecdotes | one-way observation and feedback | informal relating of shared anecdotes | no feedback |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 |

### 21. Student Evaluation

| | | | |
|---|---|---|---|
| team marking by teachers | agreement on marking scheme by teachers | sharing marking schemes with teachers | individual marking |
| 4 | 3 | 2 | 1 |

## Obtacles to Teacher-Teacher Collaboration

| | | Yes | No |
|---|---|---|---|
| 22. | Differential levels of Understanding of decision-making growth scheme across staff | 1 | 2 |
| 23. | Differential levels of skill on teaching decision-making<br>- teachers feeling their way through since it is first time teaching it. | 1 | 2 |
| 24. | Teachers not sold on teaching decision-making | 1 | 2 |
| 25. | Conflict in teaching styles | 1 | 2 |
| 26. | Teachers do not normally interact regarding instruction<br>* Split grade - different foci in instruction | 1 | 2 |
| 27. | Peer pressure not to conform | 1 | 2 |
| 28. | Competing priorities | 1 | 2 |
| 29. | Interpersonal conflict | 1 | 2 |
| 30. | Past experience in school (grade 4 experience last year) | 1 | 2 |
| 31. | No invitation to participate by teacher or teacher-librarian | 1 | 2 |
| 32. | Expectations not clear (no reason to involve others)<br>*T.L. or teacher did not attend workshop | 1 | 2 |
| 33. | No suitable place for substantive interaction | 1 | 2 |
| 34. | Teachers schedules conflict no coverage<br>*teacher-librarian too busy already | 1 | 2 |
| 35. | Classrooms not near each other | 1 | 2 |
| 36. | Absences | 1 | 2 |
| 37. | Not suitable program | 1 | 2 |
| 38. | Other.1 Teacher-Librarian works part-time | 1 | 2 |

## Obstacles to Teacher-Teacher Interaction (cont'd)

| | | |
|---|---|---|
| 39. Other.2 | 1 | 2 |
| 40. Other.3 | 1 | 2 |
| 41. Other.4 | 1 | 2 |

## General Overview

42. Satisfaction with Student Progress

| Very Satisfied | | | Very Dissatisfied |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

43. Social Economic Status of Students

| Very High | | Middle Class | | Very Low |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

44. Social Economic Status Variability

| Everbody The Same | | | Everybody Different |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

45. Final Comment

| 1 | 2 | 3 | 4 | . |
|---|---|---|---|---|
| negative | neutral | positive | excuse | blank |

# Box and Whiskers Display -- Key
# (adapted from Ryan, Joiner & Ryan, 1981)

Box and whisker displays show the main features of a distribution of scores. The middle half of each distribution is represented by a box and the median is marked with a "+". The extent of the data and the location of possibly extraordinary values (or outliers) are indicated on either side of the box with special symbols. Score distributions for groups can be displayed simultaneously.

Several definitions are needed:

- Hinges are essentially quartiles ("I").
- (H-spread) = (upper hinge - lower hinge)
- inner fences are at (lower hinge) - 1.5*(H-spread) and (upper hinge) + 1.5*(H-spread)
- outer fences are at (lower hinge) - 3*(H-spread) and (upper hinge) + 3*(H-spread)
- adjacent values are the 2 most extreme data values that are still inside the inner fences.
- dashed "whiskers" run from the hinges to the adjacent values on each side. Values between the inner and outer fences are possible outliers, and are plotted with a "*". Values beyond the outer fences are probable outliers, and are plotted with a "0".
- Notches ["(" or ")"] mark confidence intervals for the median. Two groups whose notched intervals do not overlap are significantly different at roughly the 5% level.

A priority system is used to determine what symbols will be displayed. If the median and notch fall on the same space, the notch will not be displayed. Similarly, if the median and the 'I' hinge fall on the same space, the 'I' will not be displayed.